Generational Differences in Technology Adoption in Community Colleges

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Abstract

Generational Differences in Technology Adoption in Community Colleges
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This research study investigated the technological perceptions and expectations of community college students, faculty, administrators, and Information Technology (IT) staff. The theoretical framework is based upon two assumptions on the process of technological innovation: it can be explained by diffusion of adoption theory, and by studying the relationship between wholes and parts, or Systems Thinking. The research is conducted against a backdrop of generational theory and how different generations possess varying degrees of readiness toward technology adoption.

The following research questions were posed: Question 1: How do the perceptions/expectations and utilization held by faculty, administrators, and information technology staff of a multi-college community college district surrounding technology differ from students? and Question 2: In terms of technology perceptions/expectations and utilization, are there generational differences within and between various community college professionals and students?

This quantitative study used survey research methodology to gather and analyze data from 442 students, faculty, administrators, and information technology staff at four

community colleges within one district. The *CDW-G 21st Century Campus Assessment Tool* was sent out via an email invitation to gather the perceptions, expectations, and utilization of technology. With a total response rate of 10.60% (4171), the response rates for each group were: students (11.83%, n= 186), faculty (8.34%, n= 199), administrators (24.13%, n=28), and information technology staff (29.29%, n= 29). Thirty-five percent of the respondents were members of the Baby Boomer generation, 37% were Gen X, and 24% were Millennials.

Results from the first research question revealed the perceptions and expectations held by faculty, administrators, and information technology staff regarding campus technology and the importance of technology to learning and student success do differ from those of students. Additionally, the use of technology devices and email also differ between these groups. The conclusions drawn encourage a focus on professional development for Baby Boomers, allowing for the cross-fertilization of input from Millennials and Gen X and consideration of succession planning in terms of how inputs to an organization will change as younger generations take on positions of leadership and engage in strategic planning and decision making.

Dedication

I humbly dedicate this work to the one person in my family that never stopped asking me where I was going to go to college, my aunt, Ana Soriano.

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I would like to thank the participants at the four colleges and district office at which this study was conducted. Their insights and opinions were critical to this study.

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Chapter 1: Introduction

Introduction to the Problem and Its Context

The proliferation of technology has fundamentally transformed the traditional model of American education and virtually every aspect of daily life (U.S. Department of Education, 2010; Van Der Werf & Sabatier, 2009). While transformations are observed in higher education with increases in the number of institutions delivering instruction completely online, the proliferation of e-textbooks, online documents, hybrid courses with online and night and weekend meetings, and an emphasis on convenience with additional learning options over face-to-face instruction, teaching has largely remained unchanged for years, and according to Davidson and Goldberg (2010), even centuries. Recent studies suggest educational innovation by faculty in particular is comprised of little more than using PowerPoint and a course management system for document exchange (CDW Government, 2008). Additionally, evidence suggests students in the educational pipeline envision the role of emerging technologies in education very differently than their parents, their school's teachers, or administrators. They view these emerging technologies, such as mobile learning, online learning, and digital content as holding great promise for engaging them in contextually-based content, greater personalization of the learning process, and the exploration of knowledge with an unfettered curiosity too often missing from traditional classroom settings (Project Tomorrow, 2011, p. 3).

Yet, according to Davidson and Goldberg (2010) "conventional institutions of learning have changed far more slowly than the modes of inventive, collaborative,

participatory learning offered by the Internet and an array of contemporary mobile technologies" (p. 3). The pace of change and technology and information availability has put pressure on institutions of higher education to become more digital and responsive to today's generation members who have integrated technology into their daily lives. Community colleges, in particular, have been slow to embrace those changes and manage the expectations of today's Net Generation who are changing far more rapidly than the colleges recruiting them (Flynn, 2008; Oblinger & Oblinger, 2005). Oblinger and Oblinger (2005) suggested the current generation of students entering higher education has information technology skills exceeding those of the faculty members who will be teaching them. Davidson and Goldberg (2010) contended colleges and universities are unable to break out of traditional patterns and instead perpetuate an educational environment largely remaining unchanged. Moreover, this view is also supported by researchers who conclude, "colleges and universities are insulated from many competitive pressures that might influence quick adoption of innovation" (Murray, 2008, p. 51), which, along with a variety of other reasons, impede more rapid adoption of innovation in higher education. Yet in a climate of diminishing resources and increasing enrollments, college and university leaders strive "to find a balance between innovation and tradition to remain relevant and current in a rapidly changing world" (Flynn & Vredevoogd, 2010, p. 5).

Not only is leadership challenged by the many ways technology has transformed higher education, but attitudes toward technology and its utilization by an increasingly diverse workforce are also at play. For example, institutions often rely on demographic information such as date of birth, area of residence, gender, and ethnicity to understand

the needs of their learners. What is not as easily understood is how students view the world, what is important to them, and how they learn best (Oblinger & Oblinger, 2005).

One area of diversity that could potentially shed some light on this, but is often overlooked and misunderstood, is generational differences (Arsenault, 2004). Though there is quite a range of generalizations outlining generational categories, and the nomenclature used to label the generations is not standardized, trends can be observed. Reeves and Oh (2007) described the spectrum of generational differences from different researchers and consultants. They found the most cited sources for issues related to generational differences were those by William Strauss and Neil Howe, but that most generalizations regarding generational differences should be approached with caution. Nevertheless, trends in generational differences have been the subject of a growing body of research in higher education and the corporate world. For example, many find that while large numbers of Boomers still predominate the workplace, for the first time in the academic workplace, four generations have converged. They include the youngest of the Silent generation born between 1925 and 1942; the Boomers born between 1943 and 1960; Generation X born between 1961 and 1981; and the oldest of the Millennials, or the Net Generation, born between 1982 and 2002 (Arsenault, 2004; Gordon & Steele, 2005; Oblinger & Oblinger, 2005; Strauss & Howe, 2000).

Often used interchangeably, Millennials and the Net Generation are college students born around the time the PC was introduced and have never known life without the Internet (Oblinger & Oblinger, 2005; Prensky, 2001). Recognizing the impact technology has had on generational trends, Oblinger and Oblinger (2005) asserted, "individuals raised with the computer deal with information differently compared to

previous cohorts" (p. 2.4). Prensky (2001) found, "today's students think and process information fundamentally differently from their predecessors" (p. 1). Despite differences and similarities transcending each of the generational cohorts, their presence in the workplace influences the work environment in ways giving rise to differing organizational experiences (Macky, Gardner, & Forsyth, 2008). Whether these differences can be explained by generational theory or technology use, the implications for colleges and universities are profound as the mindset of the Net Generation come up against that of most faculty, staff, and administrators (Oblinger & Oblinger, 2005). As a result, educational leaders have been charged with redefining their institutions to face the demands of this new world in a more market-oriented, student-centered, and systemic approach to change. "With access to the Internet 24/7, this new generation of learners prefers a mode of activity and interaction that is not always in sync with the traditional educational system" (Flynn, 2008, p. 23). As colleges and universities strive to engage their learners, it is becoming increasingly important to understand their perspective prior to making massive investments, in IT or otherwise, to meet their needs for "basing these decisions on assumptions is," according to Oblinger and Oblinger (2005), "risky" (p. 2.15). To better understand the decision-making demands requiring an organization to stay current and competitive with technology and changing student demographics, leaders must focus on the relationships between people and processes, understand the concept of systems thinking, and manage the human aspect of change.

Problem Statement

Given the rate of change, the evolving nature of learners, and the historical preservationist thinking of higher education systems, this research examined the degree to

which educational organizations are meeting the technological expectations and information needs of employees and students in terms of technological adoption and innovation. A mitigating factor that likely affects how decisions are made with respect to investing in or enhancing technological infrastructure within educational settings are generational differences between higher education professionals and the students they serve.

Purpose and Significance of the Problem

Purpose

This research study investigated the extent to which there are generational differences in community college professionals (i.e., administrators, staff, and faculty) and students in terms of technology expectations and utilization at a large community college district in Northern California. The research also sought to identify any gaps between higher education professionals and students' needs relative to what is currently offered at the institution under investigation. The resultant data was subsequently presented at an institutional technology symposium and served as a platform for dialog and strategic direction for the district.

Significance

The problem of having four distinct generations in the academic workplace is a significant issue facing institutions of higher education and community colleges across the country, and its influence on a number of factors is increasingly being studied (Arsenault, 2004; Gordon & Steele, 2005; Hannay & Fretwell, 2011; Murray, 2008, 2011; Oblinger & Oblinger, 2005; Zemke, Raines, & Filipczak, 2000). While having several generations in the workplace is not a new phenomenon, the American workplace

today is unlike any other in history (Gordon & Steele, 2005; Zemke et al., 2000). Today the three larger generations making up the workforce are Baby Boomers, Generation X, and Millennials. While the smallest cohort, the Veterans, are a fraction of today's workforce. The gulf of misunderstanding and resentment between these four generations is growing and much of the research shows employers are experiencing tension between employees from different generational cohorts (Dychtwald, Erickson, & Morison, 2007; Erickson, 2008; Leiter, Price, & Laschinger, 2010; Reeves & Oh, 2007; Zemke et al., 2000). This same tension arguably exists between those who lead and teach in higher education and the students they serve (Flynn, 2008; Oblinger & Oblinger, 2005). The technological divide among the generations is consciously and unconsciously perpetuated by those in positions of power, which tend to be the Boomer generation. This generation, in turn, generally holds the decision rights with respect to technology innovation, adoption, and resource allocation to support such efforts.

While research has been conducted on the role of computing, eLearning, and information technology in American higher education, little research has been done in the context of community colleges. The largest such study, The Campus Computing Project, begun in 1990, draws on qualitative and quantitative data to help inform campus IT leaders, college faculty, administrators, and policymakers from all sectors of public and private higher education institutions; yet public community colleges, the largest system of all, represent only 12% of the responses (Green, 2010). Additionally, there continue to be calls for more scholarly research focused on generational differences seeking to solve real-world problems related to teaching, learning, and performance support (Reeves & Oh, 2007). Hence, it is expected this study will generate new knowledge on the adoption

of technology in a community college setting, and, in particular, the emerging research area of generational differences. As alluded to, the organizational setting for this study was a large community college district in Northern California, which serves the greater Sacramento region. Participants in this study included 2,599 employees and 1,572 students. Employees are comprised of 116 administrators, 2,384 full- and part-time faculty, and 99 information technology staff. A validated survey, *CDWG 21st Century Campus Assessment Tool*, was administered to all participants through a web-based survey tool.

Research Questions

The following research questions were posed for this study:

1. How do the perceptions/expectations and utilization surrounding technology held by faculty, administrators, and information technology staff of a multi-college community college district differ from students?
2. In terms of technology perceptions/expectations and utilization, are there significant generational differences within and between various community college professionals and students?

Conceptual Framework

Researcher's Stance

This study used a quantitative research design to answer the research questions posed. Quantitative research can be useful because it can examine patterns or trends and show that a problem is numerically significant. According to Creswell (2008), a quantitative approach is used when the "researcher seeks to establish the overall tendency of responses from individuals and to note how this tendency varies among people" (p.

51). Quantitative inquiry supports the general approach to this study, which is to explain how perceptions and expectations differ among and between groups of individuals and the characteristics of those individuals as defined by their generational affiliation. By explaining a relationship among the generations, how these differences might influence the variable of technology adoption can be explored. While many in higher education often talk about the Net Generation's expectations for the use of technology in their learning environments, few efforts have actually engaged students in a dialogue about how they would like to see faculty and their institutions use technology to help students learn more effectively (Oblinger & Oblinger, 2005, p. 3.1). As such, this method allows for the collection of data, using instruments with preset questions and responses, from a large number of students, as well as faculty, administrators, and IT staff. The survey results pertain to the thoughts and perceptions of the participant groups rather than to actual behavior.

Existing Theory

Three theories provide the conceptual framework for understanding the impact the generations have on technology expectations and utilization. The review: (a) highlights the literature on the theory of generations; (b) studies the relationship between wholes and parts from the methodological point of view, or systems thinking (Klir, 1991); and (c) explores how the process of technological innovation can be explained by diffusion of adoption theory.

Generations. A LexisNexis Survey (WorldOne Research, n.d.) suggested attitudes toward the use of technology vary based on age. Representing 30% of the general population, the Boomer generation's values lay the foundation for many of

today's management practices, derived in part by the way Boomer employees value hard work, family, the need to address gender equality, and a demand for participatory democracy in the management decisions of the organization. What is most telling about this generation's attitude toward technology is their view of computers and the internet which they believe negatively effects productivity and business. Their attitudes and behavior toward technology largely reflect a generation who knows and understands the use of the telephone and television as marketing and communications tools. As a result, despite making notable gains, they use technology less than other generations, from personal computers to mobile devices (Zickuhr, 2010).

In a teaching and learning environment, how technological innovations are perceived, and acted upon, by managers will have a direct impact on others within the organization, namely the tech savvy Millennial or Net Generation. If Boomers are the administrators setting the priorities, allocating resources, and limiting the penetration of technology, they are likely creating: (a) a workplace vastly different from one serving the needs of those workers who will replace them as senior managers of the institution, and (b) a learning environment unresponsive to the ways in which students receive, process, and generate information in a global society.

Systems theory. How the previously mentioned gaps are addressed requires an understanding of the teaching and learning environment as a complex system that must stay compatible with information society and organizational innovations, such as changes in technologies, processes, and structures of the organization themselves. Organizations are comprised of many interrelated subsystems, including strategic, human,

technological, structural, and managerial subsystems (Morgan, 1996). Klir (1991) suggests:

> Demands on organizational innovations will be more frequent, more extensive, and will have to be implemented faster than in the past. All these demands on organizations in information society indicate that organizations will be required to function as anticipatory systems, i.e. Systems that possess on-going capabilities of building relevant systems models of their environments and are able to use these models for making decisions and actions that optimize specific goals. This means that on-going systems modeling of relevant aspects of the environment will be an essential feature of the decision-making infrastructure of organizations. This implies that expertise in systems science will be in increasing demand by organizations in the information society. (p. 218)

Innovation diffusion theory. According to Rogers (2003), getting a new idea adopted, even when it has obvious advantages, is often very difficult. Many innovations require a lengthy period, often of many years, from the time they become available to the time they are widely adopted. Therefore, a common problem for many individuals and organizations is how to speed up the rate of diffusion of an innovation (p. 1). Diffusion of innovation theory explains the adoption and diffusion of technology. Rogers's theory takes into account the evaluation, selection, adoption, and diffusion process within the innovation decision process, most relevant to this research. How the process of diffusion is communicated to the various stakeholders of an organization impacts adoption through the social system. How these factors influence decision making and eventual implementation will be further investigated.

Definition of Terms

The following terms are used throughout the remainder of this study and are defined for applicability to the research questions being investigated.

Adoption

Decision to make full use of an innovation (Rogers, 2003, p. 21)

Boomer

Refers to the great spike in fertility between 1946, after the end of World War II, and 1960 through 1964 (Zickuhr, 2010; Strauss & Howe, 2000)

Diffusion

A process by which an innovation is communicated through certain channels over time among members of a social system (Rogers, 2003, p. 11)

Feature phone

A cellphone that contains a fixed set of functions beyond voice calling; however, a feature phone is not as flexible as a smartphone. Feature phones may offer Web browsing, but they generally cannot download an endless variety of apps from an online marketplace (pcmag.com, n.d.a).

Generation theory

The study of a cohort-group that shares an age location in history and a common peer personality (Strauss & Howe, 1991)

Gen X

Refers to those born between 1960-1965 and 1980-1981 (Strauss & Howe, 2000; Zickuhr, 2010)

G.I.

Elders, born 1901through 1924 (Strauss & Howe, 1991)

Innovation

An idea, practice or object perceived as new by an individual or other unit of adoption (Rogers, 2003, p. 12)

Millennials

Members of the high school graduating class of 2000 (Strauss & Howe, 2000)

Net Generation

Includes students who have never known a world without computers, the World Wide Web, highly interactive video games, and cellular phones (Oblinger & Oblinger, 2005, p. 3.1)

Silent

Midlifers, born 1925 through 1942 (Strauss & Howe, 1991)

Smartphone

A cell phone with built-in applications and Internet access. An iPhone is a type of smartphone (pcmag.com, n.d.b).

System

Defined by a formula where (S=T, R). In this formula "S" is the system, "T" denotes a set of things, and "R" denotes a relation or a set of relations. A system is comprised of a set of elements standing in interaction (Klir, 1991, p. 5). Organizations consist of several interrelated subsystems, including strategic, human, technological, structural, and managerial subsystems (Morgan, 1996).

Technology

A design for instrumental action that reduces the uncertainty in the cause-effect relationship involved in achieving a desired outcome (Rogers, 2003, p. 13)

Assumptions, Limitations, and Delimitations of the Study

The following assumptions and limitations may be pertinent to this study:

Assumptions

1. It was assumed respondents would respond honestly to the survey.
2. It was assumed the survey instrument, *CDWG 21st Century Campus Assessment Tool*, is a valid and reliable measure of technology preferences and expectations.
3. It was assumed the survey instrument, *CDWG 21st Century Campus Assessment Tool*, would be easily understood by participants.
4. It was assumed the survey instrument, *CDWG 21st Century Campus Assessment Tool* as an instrument that has predominantly been utilized by four-year colleges and universities, would yield useful information to inform future directions for a community college district.

Limitations

1. This study was limited to surveying students, faculty, administrators, and information technology (IT) staff at a large northern California community college district. Hence, inferences from this study should not be generalized to other institutional settings.
2. Depending on the number of respondents (i.e., response rate), the results may not be generalizable to the entire district or to an individually identified college in the district.
3. Despite the confidentiality and anonymity provisions of the research, potential bias may have been present in that participants may have felt as though they must respond in a socially desirable manner. Although given the nature of the

students and topic of interest, technology, social desirability effect is not expected to be a significant limitation in this study.

4. This study used a single survey instrument as the data collection method, which included both closed- and open-ended questions. Hence, mono-method bias exists.
5. Although the *CDWG 21st Century Campus Assessment Tool* is not a psychometrically validated instrument, it is a sound instrument for the collection of input from multiple stakeholders about their perceptions of and utilization of technology. Its content was given an expert review by the LRCCD technology administrator, institutional researcher, and was reviewed by the dissertation chair of this researcher. Based on that review, modifications to the instrument were made to ensure applicability to the purpose of the study and the organizational setting.

Delimitations

Three delimitations warrant mention in this study. First and foremost, the research study was limited to a single community college district given that the population was largely a convenience sample and no other district was accessible. Second, students under the age of 18 were excluded from the sample to avoid any parental consent issues. And third, the classified staff participants in the study were limited to IT staff rather than all classified personnel. While it would have been interesting to observe trends across the different work groups, this was not directly relevant to the purpose and intent of the study.

Summary

This research study investigated to what degree a community college district is keeping pace with the technological expectations of community college professionals and students. The theoretical framework is based upon two assumptions: the process of technological innovation can be explained by diffusion of adoption theory, and by studying the relationship between wholes and parts from the methodological point of view, or Systems Thinking (Klir, 1991). The research is conducted against a backdrop of generational theory and how different generations possess varying degrees of readiness toward technology adoption.

Chapter 2: Literature Review

Introduction to the Problem

Information technology (IT) has changed the teaching and learning environment (Altbach, Berdahl, & Gumport, 2005; Economist Intelligence Unit, 2008). Advances in technology, according to Altbach et al. (2005), have influenced the nature of knowledge, as well as the process and social organization of teaching and learning. Yet despite the fact the lag between the development of technology and its adoption can last centuries and innovations spread slowly, the impact of technology has radically altered long-held assumptions on the basic structure of higher education. While the world of information technology is fast-paced, dynamic, and ever changing, the culture of education, however, is slow. Its changes are subject to institutional structures and systems, creating tension between the fast-paced culture of IT and the slower-paced culture of higher education (Altbach et al., 2005; Beverage, 2003). This tension is exacerbated by the expectations of tech savvy students, members of Gen X and Gen Y (Prensky, 2001; Schaffhauser, 2010), who have never known life without a computer. The quick evolution of information technology is challenging leaders of educational institutions as lack of adequate design staff, rising IT costs, and varying degrees of institutional willingness impede the adoption of new technologies (Altbach et al., 2005; Economist Intelligence Unit, 2008). According to Schaffhauser (2010):

> In order to survive the desert of diminishing budgets, it's essential to have a plan for catering to the computing expectations of current and incoming students. Knowing what matters to students can help IT prioritize potential investments and, likewise, eliminate those futile initiatives in search of users.

Conceptual Framework

To better understand the influences different generations have on technology expectations and utilization in a community college environment, this conceptual framework is discussed around three areas of research. The review: a) highlights the literature on the theory of generations; b) studies the relationship between wholes and parts from the methodological point of view, or systems thinking (Klir, 1991); and c) explores how the process of technological innovation can be explained by diffusion of adoption theory.

Review of the Literature

Introduction

The literature review outlines a conceptual framework to help identify factors related to the human aspects of technological change within an educational system. This chapter is divided into three literature areas including a discussion of the theory of generations, systems theory, and diffusion of innovation theory.

A theory of generations asserts people of the same cohort group behave and act in ways shaped by social influences. As a global force that has changed the world, the pace of technological progress has been identified as an event that has dramatically and irreversibly transformed human life (Kurzweil, 2005; Laufer, 1971; McDaniel, 2002; Prensky, 2001). As the rate of change is accelerated over time, doubling every decade, the evolutionary process of technology improves capacities in exponential fashion (Kurzweil, 2005, p. 40). Many have described the effects of this paradigm shift on education (Altbach et al., 2005; Kurzweil, 2005). Moreover, the challenges of keeping pace with the needs of tech savvy students and employees born into this generation in

which technology has become an established part of the community have been well documented (Educause, 2005; Pew Research Center, 2010). Leaders of complex teaching and learning environments recognize their institutions are comprised of many interrelated subsystems that include strategic, human, technological, structural, and managerial subsystems and that they must prepare their organizations to anticipate the technological progress on the horizon (Morgan, 1996). To do this requires an understanding of systems science and systems theory (Klir, 1991), as systems science shares a strong linkage with technology (p. 24). Innovation diffusion theory provides a means by which institutions can better understand their institution's capacity to respond to these complex and unpredictable technological phenomena. These three theories provide a framework for understanding the important role generational differences have on technological innovation and implementation in complex educational systems.

Generational Theory

Historically, the term "generation" denoted a standard measure of cosmic time. Eventually, it came to refer to a cohort-group sharing an age location in history and a common peer personality (Strauss & Howe, 1991). Members of the same generation are, according to Strauss and Howe, shaped in the same way, at the same time, and at the same stage of life by a social moment and not simply by a person's membership in a chronological generational cohort (Reeves & Oh, 2007). They asserted a social moment can establish well-defined cohort generations of similar length. A cohort generation is defined as:

> everyone who belongs to the same cohort-group. Fathers and mothers or brothers and sisters in the same family generation do not necessarily belong to the same

> cohort generation. But unlike the family generation, all members of the same cohort generation live in the same social or historical time. (p. 437)

Generation theory has predominantly informed quantitative studies in sociology since it was first coined in 1863 by the French sociologist Emile Littre (Elder, 1994; Lifecourse.com, 2010).

Strauss and Howe (1991) contend that cohort generations are to societies what family generations are to families, where the earlier generation is always older than the next and normally exercises authority over those that follow. The differences in the generations are characterized by distinct peer personalities bound together by a single social time. While little can be found on exactly how a generation rises, many writers have postulated, without great precision, on how long a generation lasts (Reeves & Oh, 2007; Strauss & Howe, 1991, 2000). Despite this variance, there appears to be general agreement that the length of a cohort generation must be linked to the length of a phase of life. When that life span experiences a social moment, how individuals respond is affected by their current phase of life. With each social moment, groups separately coalesce into generations.

While some generations have been up to 24 years in length, Strauss and Howe (2000) have found that none has been shorter than 17 years. Among the nine generations born over the past 200 years are the Millennials. They are the fifth and last generation to be born in the 20th century. Generation categories have been described by Strauss and Howe (2000) and provide a framework from which the generational persona can be understood. These categories are referred to as G.I., Silent, Boom, X, and Millennial, as illustrated in Table 1 (Strauss & Howe, 2000, p. 41).

Table 1

Twentieth Century Generations

Generation	Birth Years	Famous Man	Famous Woman
G.I.	1901-1924	Ronald Reagan	Ann Landers
Silent	1925-1942	Martin Luther King, Jr	Sandra Day O'Connor
Boom	1943-1960	George W. Bush	Hillary Clinton
X	1961-1981	Michael Jordan	Courtney Love
Millennial	1982-2002	Zac Hanson	Tara Lipinski

Note: Adapted from *Millennials Rising: The Next Great Generation* (p. 41), by N. Howe and W. Strauss, 2000, New York: Vintage Books. Copyright 2000 by Neil Howe and William Strauss.

But as previously mentioned, various authors significantly disagree about which span of years should be encompassed within any one generation. These different labels are summarized in Table 2 (Reeves & Oh, 2007, p. 296).

Table 2

Generational Labels and Dates

Source	Labels			
Strauss & Howe (2000)	Silent Generation 1925-1943	Boom Generation 1943-1960	13th Generation 1961- 1981	Millennial Generation 1982-2000
Lancaster & Stillman (2002)	Traditionalists 1900-1945	Baby Boomers 1946-1964	Gen Xers 1965-1980	Millennial Generation; Echo Boomer; Generation Y; Baby Busters; Generation Next 1981-1999
Martin & Tulgan (2002)	Silent Generation 1925-1942	Baby Boomers 1946-1960	Generation X 1965-1977	Millennials 1981-1999
Oblinger & Oblinger (2005)	Matures <1946	Baby Boomers 1947-1964	Gen Xers 1965-1980	Gen Y; NetGen; Millennials 1981-1995

Table 2 (continued)

Tapscott (1998)		Baby Boomers 1946-1964	Generation X 1965-1975	Digital Generation 1976-2000
Zemke et al. (2000)	Veterans 1922-1943	Baby Boomers 1943-1960	Gen Xers 1960-1980	Nexters 1980-1999

Note: Adapted from "Generational Differences," by T. Reeves and E. Oh. In Handbook of Research on Educational Communications and Technology, (p. 296), 2007, Mahwah, NJ: Lawrence Erlbaum Associates.

"Every generation defines itself against a backdrop of contemporary trends and events" referring to a common location in history (Strauss & Howe, 2000, p. 46). One of the key events that has shaped the Millennial generation is the emergence of new technologies (Strauss & Howe, 2000). Strauss and Howe described the numerous differences in technology that have widened the gap between the different generations. These events are reflected in Table 3 (Strauss & Howe, 2000, p. 49).

Table 3

Technology Trends That Have Shaped the Generations

Technology	Baby Boomer	Gen X	Millennial
Electronic Products	broadcast TV	cable TV	interactive TV
	78s and LPs	cassettes and CDs	streaming and MP3s
	8mm film	VCRs	DVDs
	vacuum tubes	transistors	microchips
	mainframes	calculators	personal computers
Consumer Products	made in U.S.A	imports	global production
	sedans and station wagons	beetles and hatchbacks	minivans and SUVs
	electric ranges	microwaves	delivered food
	room fans	A/C units	climate control
Public Infrastructure	test satellites	moon launches	space shuttles
	B-52s	ICBMs	stealth and smart bombs
	interstate highways	telcom satellites	the internet

Note: Adapted from *Millennials Rising: The Next Great Generation* (p. 49), by N. Howe and W. Strauss, 2000, New York: Vintage Books.

As Millennials enter the workplace, the gap between the generations is highlighted in the research in which 75% of employers say they are experiencing tension between employees from different generations (Howe & Nadler, 2012). This was also highlighted in Erickson (2008) who described Gen Y as having "high expectations for the technology you will use at work, but, because many companies are not as up to speed as you are, you may find old technology getting in the way of speed and effectiveness" (p. 7). In an educational context, this tension is present between those from one generation who lead and teach and those from another who learn. But it is also present between the younger employees of an educational entity, the Millennials, who are geared toward the adoption of technology, and those leading the institutions from the Boomer generation and who hold the decision-making power on matters of technology development and adoption and resource allocation to support such efforts.

A 2008 LexisNexis Survey, conducted by WorldOne Research (n.d.), showed attitudes toward the use of technology vary based on age. Representing 30% of the population, the Boomer generation's values lay the foundation for many of today's management practices, derived in part in the way Boomer employees value hard work, family, the need to address gender equality, and a demand for participatory democracy in the management decisions of the organization. What is most telling about this generation's attitude toward technology is their view of computers and the internet, which reflects beliefs these new technologies have negative effects on productivity and

business. Their attitudes and behavior toward technology largely reflects a generation who knows and understands the use of the telephone and television as marketing and communications tools. They simply did not "grow up digital" (Dychtwald et al., 2007). As a result, they use technology less than other generations, from personal computers to mobile devices (Zickuhr, 2010).

Cohort segmentation, however, is not without its critics. Challenging the importance of the generation gap, Giancola (2006) takes a critical view of popular and scholarly research and finds the research does not fully support the assumptions of generational theory. Citing various studies that do not support the assumption that all members of a generation experience the same events in the same way, Giancola (2006) counters generational advocates and concluded there are "good reasons to regard the generation gap as an idea that is more myth than reality" (p. 1). Similarly, in their analysis of generational differences at work, Macky, Gardner, and Forsyth (2008) contended the repeated stereotypes of different generational cohorts in the workforce are based either on anecdotal evidence or data not open to critical peer review. They purported there may be more variation among members within a generation than there is between generations. Finally, Noble and Schewe (2003), in an effort to validate the notion of generational cohorts, gathered data on 373 subjects aged 17 to 80 to determine if subjects' ratings on seven value dimensions could predict their cohort membership. Despite findings lending some support to cohort membership, the authors concluded instead the need to reassess the theory of cohorts and what underlies group cohesiveness and similarities within age groups.

Despite criticisms against examining the preferences of today's generation of college students and employees, understanding how generational differences may influence decisions regarding teaching and learning is certainly not without merit. In a teaching and learning environment, how technological innovations are perceived, and acted upon, by managers will have a direct impact on others within the organization, namely the tech savvy Generation-X and the "Digital Natives" of Millennials. If Boomers are the administrators setting the priorities, allocating resources, and limiting its penetration, they are likely creating: a) a workplace vastly different from the needs of those workers who will replace them as senior managers of the institution, and b) a learning environment unresponsive to the ways in which students receive, process, and generate information in a global society.

Systems Theory

How these gaps are addressed requires an understanding of the teaching and learning environment as a complex system that must stay compatible with information society and organizational innovations, such as changes in technologies, processes, and structures of the organization themselves. Organizations are comprised of many interrelated subsystems, including strategic, human, technological, structural, and managerial subsystems (Morgan, 1996). Klir (1991) suggests:

> Demands on organizational innovations will be more frequent, more extensive, and will have to be implemented faster than in the past. All these demands on organizations in information society indicate that organizations will be required to function as anticipatory systems, i.e. systems that possess on-going capabilities of building relevant systems models of their environments and are able to use these models for making decisions and actions that optimize specific goals. This means that on-going systems modeling of relevant aspects of the environment will be an essential feature of the decision-making infrastructure of organizations. This

> implies that expertise in systems science will be in increasing demand by organizations in the information society. (p. 190)

Origins of systems theory. Compared to its roots in the study of systems, systems science is a relatively new phenomenon dating back to the middle of the last century. According to Klir (1991), it stemmed from the systems movement characterized "as a loose association of people from different disciplines…who share a common interest in ideas…that are applicable to all systems" (p. 19). Klir (1991) also went on to discuss the systems movement, which he said, "emerged from three principal roots: mathematics, computer technology, and a host of ideas that are well captured by the general term Systems Thinking" (Klir, p. 19). Since the printing of Newton's Principia in 1687, mathematics has played a key role in describing and dealing with systems and various areas of science. However, with the onset of the new scientific discoveries and disciplines of the 20th century, mathematics can no longer handle the job alone. Therefore, a systems movement characterized by a loose association of people from different disciplines of science, engineering, philosophy, and other areas who share a common interest in ideas applicable to all systems transcending the boundaries between traditional disciplines has sprung up and spread slowly through the second half of the century. Weaver (as cited in Klir, 1991) described the notion of disorganized complexity as a means to understanding systems through the seemingly disorganized motion of balls on a billiard table. He wrote:

> They represent a problem in which the number of variables is very large, and one in which each of the variables has a behavior which is individually erratic, or perhaps totally unknown. However, in spite of this helter-skelter, or unknown, behavior of all the individual variables, the system as a whole possesses certain orderly and analyzable average properties. (p. 20)

This same degree of complexity links computer technology with the systems movement through a specialized discipline called systems science.

Klir (1991) owes the coinage of terms such as general systems and general systems research to Ludwig von Bertalanffy (Drack, 2009). According to von Bertalanffy, the recorded originations of systems or the view of the "world reflected in a cleverly designed abstract game" (von Bertalanffy, 1968, p. 11) began with Nicholas of Cusa's *De ludo globi* (On the Game of the World) in 1463. His microcosmic theory held that God is the absolute unity who reconciles all distinctions and contradictions (as cited in Conger, 1922, p. 54). In the late 1920s, von Bertalanffy wrote:

> Since the fundamental character of the living thing is its organization, the customary investigation of the single parts and processes cannot provide a complete explanation of the vital phenomena. This investigation gives us no information about the coordination of parts and processes. Thus the chief task of biology must be to discover the laws of biological systems (at all levels of the organization). We believe that the attempts to find a foundation for theoretical biology point at a fundamental change in the world picture. This view, considered as a method of investigation, we shall call "organismic biology' and, as an attempt at an explanation, "the system theory of the organism. (as cited in von Bertalanffy, 1972, p. 410)

Von Bertalanffy's tenets later became known as general systems theory, where the term "organism" can be replaced with "organized entities," such as social groups, personality, or technological devices (Drack, 2009; Klir, 1991).

In his discussion on general systems theory, or GST, von Bertalanffy defined the aims of GST as follows: (a) a general tendency toward integration of the various sciences, natural and social; (b) such integration should be centered in a general theory of systems; (c) such theory could become an important means for aiming at exact theory in non-physical fields of science; (d) developing unifying principles through individual

sciences, bringing closer to reality the goal of unity of science; and (e) a much-needed integration in scientific education (von Bertalanffy, 1968, p. 38).

Drack (2009) summarizes von Bertalanffy's approach to order and organization in the following excerpt from his 2009 outline of the system theory of life:

> The characteristic of life does not lie in a distinctiveness of single life processes [Lebensvorgange], but rather in a certain order among all the processes' (von Bertalanffy, 1934a). Observing events only separately will not reveal anything about the organization of the organism. And biology must grasp the organism as a whole. (p. 565)

Organizations as systems. Katz and Kahn (1978) described organizations as social systems dependent upon the environment in which they exist for inputs. Open systems theory allows for repeated cycles of input, transformation (i.e., throughputs), output, and renewed input within organizations. A feedback loop connects organizational outputs with renewed inputs. Traditional organizational theories have viewed organizations as "closed" systems independent of the environment in which they exist (Katz & Kahn, 1978). In addition to Katz and Kahn (1978), Scott (1981) also described systems as opened or closed, and as such, organizations can be seen as rational, natural, or open. The rational system definition states, "an organization is a collectivity oriented to the pursuit of relatively specific goals and exhibiting a relatively highly social structure" (pp. 21-23). Natural systems says:

> An organization is a collectivity whose participants are little affected by the formal structure or official goals but who share a common interest in the survival of the system and who engage in collective activities, informally structured, to secure this end. (pp. 21-23)

The open systems definition says, "an organization is a coalition of shifting interest groups that develop goals by negotiations; the structure of the coalition, its activities, and its outcomes are strongly influenced by environmental factors" (Scott, 1981, pp. 21-23).

The rational system model of organizations stresses such things as information, efficiency, optimization, implementation, and design, along with a set of concepts indicating the cognitive limitations of the individual decision-maker and the effects of the organizational context in which rational choices are made – constraints, authority, rules, directives, jurisdiction, performance programs, and coordination (Scott, 1981). The Scientific Management Approach exemplifies the rational system model, whereby Frederick Taylor and his followers insisted it was possible to scientifically analyze tasks performed by individual workers to discover "the one best way" to get the job done (Locke, 1982). Studies concentrated on the tasks of the individual worker, although this ultimately led to changes in the entire structure of work arrangements.

The natural system model differs from the rational system model in that it places a greater emphasis on human behavior; and formal structure is less important than in the rational system. This model differentiates between two different types of organizations, the informal and the formal: (a) formal is seen as the patterns of human interrelations, as defined by the systems, rules, policies, and regulations of the organization; (b) the informal organization has less structured policies, rules, and systems, and an absence of a blueprint plan or an organizational chart. The natural system is characterized by the informal model, where people are viewed as individuals with a head and a heart. Unlike the rational system model, the natural system model emphasizes commonalities between organizations and other systems.

The open systems model applies to organizations capable of self-maintenance on the basis of a throughput of resources from the environment (Scott, 1981). Open systems move toward a state of negative entropy (negentropy), unlike closed systems, which move toward a state of entropy because they cannot accept inputs from the environment. Successful open systems restore their energy and repair breakdowns in the organization by acquiring inputs at greater rates than their outputs. Morphogenesis refers to the processes that elaborate or change the system-growth, learning, differentiation, and more.

Learning institutions, and particularly institutions of higher education, are predicated upon an open-systems model. In a discussion paper on improving or restructuring higher education to reflect the new realities of the post-industrial information knowledge age, Banathy (1999) posited, "When I think of learning systems I start with three questions. Who is the key entity of the system? What is the key function? How can we organize the education for attaining the best possible learning outcomes" (p. 133)? In an open-systems paradigm the key entity is the learner and the key function is to make arrangements and provide resources by which the learner will attain the desired competence. The open system undergoes a morphogenesis allowing the organization to make adjustments in the learning resources and arrangements if competence is not attained; the result being an ongoing conversation between the learner and the faculty and a shift from instruction to learning. Banathy (1999) concluded by describing the learning epistemology of such a system as comprised of several interdependent and interacting components. These components are "constructivist, authentic, situated, application focused, tailored, integrated, and reflective" (Banathy, 1999, p. 31), each of which

describe a different learning experience and the complex interactions between students and the construction of new knowledge.

Higher education around the world is undergoing transition as a result of technological forces (Banathy, 1999; Ison, 1999), and change is inevitable. Scott (1981) pointed out organizations as we know them have not always existed. They evolved during the past few centuries as part of social changes – the development of individualism and the freeing of resources, including individuals, which can be used for specialized purposes. Organizations are brought into existence by increased needs to coordinate and control complex administrative and technical tasks. Organizations as social systems form the context within which diffusion of innovation occurs and within which many innovation decisions are made (Rogers, 2003). Higher education systems developed for an industrial age are no longer adequate as we enter the 21st century (Ison, 1999).

Innovation Diffusion Theory

Diffusion of innovation theory explains the adoption and diffusion of technology. According to Rogers (2003):

> Getting a new idea adopted, even when it has obvious advantages, is often very difficult. Many innovations require a lengthy period, often of many years, from the time they become available to the time they are widely adopted. Therefore, a common problem for many individuals and organizations is how to speed up the rate of diffusion of an innovation. (p. 1)

Rogers's theory takes into account the evaluation, selection, adoption, and diffusion process within the innovation decision process. How the process of diffusion is communicated to the various stakeholders of an organization will impact adoption through the social system.

The study of diffusion explains social change and has historically been a means to evaluate the impact of development programs on agriculture, family planning, public health, and nutrition. In addition, according to Rogers (2003), it has provided a construct from which to understand technological innovation. In its broadest sense, a technology is a design that provides for a degree of certainty about how something will happen, or "a means of uncertainty reduction that is made possible by information about the cause-effect relationship upon which the technology is based" (p. 13). Specifically, a technology consists of two parts: the tools of the technology known as hardware and the information for the tool, or software. While most technologies have hardware and software components, technology is most often thought of in terms of the hardware.

Adoption of a new innovation is based, in part, upon an individual's perception of its potential to solve a problem. If the innovation is determined to be advantageous, an individual will begin to gather information about the innovation to reduce uncertainty, and then make a decision about whether to adopt or reject the new idea. Rogers (2003) summarized, "the innovation-decision process as an information seeking and information processing activity in which an individual is motivated to reduce uncertainty about the advantages and disadvantages of the innovation" (p. 14). Adoption rates are also explained by a) the relative advantage of one innovation over the idea it supersedes; b) how compatible the innovation is with the social norms and values of the potential adopters; c) the perceived degree of complexity as to its use; d) whether it is trialable, or able to be experimented with to reduce uncertainty; and e) the visibility, or observability, of the results. Relative advantage and compatibility are the key attributes influencing an innovation's rate of adoption (pp. 14-17).

How the innovation is communicated throughout the social system is what Rogers (2003) refers to as diffusion. Of particular importance is the influence that one's peer group has on the decision to adopt or reject the new idea (p. 36). Human communication is characterized as either heterophily or homophily. Heterophily, as defined in Rogers (2003), "is the degree to which two or more individuals who interact are different in certain attributes, such as beliefs, education, social status, and the like" (p. 36). Homophily, conversely, is an interaction shared by individuals with similar attributes. Heterophily facilitates rejection; homophily encourages acceptance of the innovation. Rogers (2003) categorized the adopter along a continuum as early as 1958, as illustrated in Figure 1. The five categories are: (a) innovators make up less than 3% of the population, also known as the techies; (b) early adopters make up about 13% of the population, described as visionaries; (c) early majority, or pragmatists; and (d) late majority, skeptics, make up the majority of the population at 70%; and (e) laggards, those with no interest at all in using new technologies (Jaffee, 1998; Rogers, 2003). The research suggests adoption and diffusion of innovations is largely influenced by an individual's perceptions about using an innovation (Agarwal, 1997, 1999). The study of individual perceptions, attitudes, and use provide the framework for understanding technology implementation and acceptance in a complex system such as the community college district in this study.

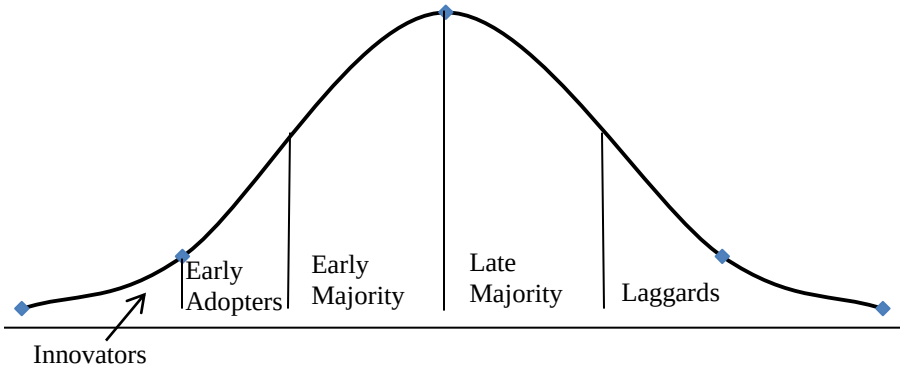

Figure 1. Roger's adopter categories. Adapted from *Diffusion of Innovations* (p. 281), by E.M. Strauss, 2003, New York: Free Press. Copyright 2003 by Everett M. Rogers.

Assessing Technology in Higher Education

A body of literature addresses the use of assessment instruments related to technology adoption in an educational settings. One instrument utilized in a study of faculty was developed in 2003 by Isleem as part of dissertation research (Sahin & Thompson, 2006). Sahin and Thompson's research was conducted in Turkey and the survey instrument, Survey of Computer Use for Instructional Purposes, was administered to 157 university faculty. With some minor modifications, the instrument was intended to measure the level of faculty computer use for instructional purposes. On a five-point Likert-type scale, respondents answered questions in the following areas: "level of instructional computer use and expertise, access to computers, barriers to computer access, attitudes towards computer use, and computer support" (p. 84). The instrument

also gathered information providing characteristics from Roger's theory on diffusion of innovation adopter categories. The results provided quantitative data on the barriers faculty perceived about technology adoption. The information provided a means to move faculty to higher levels of use and expertise in instructional technologies.

Another means of assessing technology integration in an educational setting was developed at a Midwestern school district (Mills & Tincher, 2003). Through a collaborative process, the institution established benchmarks that would be used to evaluate the progress of teachers through the identified stages. The intent of this effort was to collect baseline data to inform technology integration into the future. The resulting three skill sets were: a) Using technology as a tool for professional productivity, b) facilitating and delivering instruction using technology, and c) integrating technology into student learning. The instrument was provided to all 147 teachers in the district at the beginning of the year and the end of the year. The instrument was completed by 70 teachers on the front end, 78 teachers on the backend, and 46 completed by both. The resulting data provided information on the use of computers by teachers for instructional purposes and identified gaps where professional development was needed to enhance and increase technology integration.

Unlike the prior two assessments limited to faculty, the Survey of Technology Use-Consumer was administered in the states of Pennsylvania and New York to 39 faculty, 27 support staff, and 462 students (Demuth, 2010). The Institute for Matching Person & Technology developed the instrument to better match users of technologies with the most appropriate devices for their use (Institute for Matching Person & Technology, 2010). Its purpose is to "enhance the situation of technology users through

research, assessment, training and consultation" (para. 1). Like Sahin and Thompson (2006), the research examined the adoption of technology by faculty, staff, and students to identify variables that would inform technology adoption according to Rogers's five acceptance categories. The findings suggest respondents' perceptions about technology are related to technology adoption.

In an effort to better understand the role individual difference has on technology usage, Agarwal and Prasad (1998) developed a scale based on the previous work of researchers in the area of personal innovativeness and information technology adoption (PIIT). The resulting scales were administered to 175 students enrolled in an MBA program at a comprehensive university. As a tool of comparison, scales from the Computer Playfulness Scale (CPS) were used as an alternate measure of construct validity. Other scales utilized included the Open Processing Scale, the innovativeness scale, the innovation subscale of the Jackson Personality Inventory, and the Kirton Adaption-Innovation Inventory. Each of these scales, according to Agarwal and Prasad (1998), are intended to measure a personality trait conceptualized as "willingness to change" in response to technology adoption. Despite their recommendation for further refinement of the PIIT scales, their results indicate PIIT is a variable that influences technology acceptance and adoption. Another instrument, the LexisNexis Technology Gap Survey, was designed to investigate whether or not there is a gap between generations of legal and white collar professionals in terms of technology in the workplace (WorldOne Research, n.d.). The national survey of 450 professionals concluded attitudes toward the use of technology vary based on age.

Community colleges are, as Katz and Kahn (1978) described social systems, which are dependent upon the environment in which they exist for inputs. These complex organizations are comprised of many diverse stakeholder groups that can be characterized as belonging to different generational cohorts. As leaders are challenged by the pressing demands to personalize the learning process for a generation of students that has grown up digital, while at the same time struggling to balance the needs and working styles of four generations in the workplace, they clamor for ways to improve productivity and engagement for all members of the organization. Many of these efforts are manifested in technological innovations. As has been described in the literature, innovation diffusion is largely affected by the personal characteristics of adopters, and these innovations take place within a social system, the community college organization. Taken together, the three research streams suggest the study of technology acceptance and usage from a systems perspective, a context from which to better understand the influence of human behavior on innovation decisions. As a greater number of students from various generations enroll in higher education institutions and are merged in those institutions with the different generations in the workplace, different approaches to education and training are required. It is through the triangulation of these overlapping concepts that the three streams of literature theoretically support the research questions under investigation in this study.

Chapter 3: Method

Introduction

The present study investigated the extent to which perceptions and expectations in regard to technology differ among students, faculty, administrators and IT staff at a large community college district in Northern California. Generational differences were examined as a primary variable of interest. The following research questions were posed for this study:

1. How do the perceptions/expectations and utilization surrounding technology held by faculty, administrators, and information technology staff of a multi-college community college district differ from students?
2. In terms of technology perceptions/expectations and utilization, are there significant generational differences within and between various community college professionals and students?

Site and Population

Site Description

The district was founded in 1965 as a two-year public college district serving the greater Sacramento region. It is one of 72 community college districts in the state and is comprised of four colleges and six educational centers. The district enjoys excellent accreditation status at all colleges, financial health, and a clear strategic direction. The colleges offer transfer education and associate degrees and certificates in over 70 career fields and 63 technical certificate programs. As an urban/suburban multi-college system, the district's 2,400 square mile service area spans five counties. Approximately 85,000

students are enrolled in the colleges (Los Rios Community College District [LRCCD], 2011). The site was chosen because (a) it has an established information technology structure centrally coordinated at the district level, (b) the district's recent strategic planning process placed an emphasis on the need to utilize technology to meet student need, (c) the size of the institution provides a sufficient number of target populations to study, (d) it has an excellent reputation in California and across the country, and (e) the researcher has convenient access to the participants at this site. Site access was provided in November 2011 by the chancellor of the district (see appendix A).

Population Description

Given the purpose and intent of the research, the target populations for this study include a representative sample of students, as well as all faculty, administrators, and information technology staff in the district. As of fall 2011, there were approximately 85,000 students enrolled, 990 full-time faculty employed, 1161 part-time faculty employed, 116 administrative personnel, and 99 information technology staff in this district.

Research Design and Rationale

The study represents quantitative descriptive research using a valid and reliable survey instrument. The design allows for the assessment of several key variables related to technology and technology adoption in the context of higher education across several participant groups (i.e., students, faculty, administrators and IT staff) and generational cohorts. According to Creswell (2008), a quantitative approach is used when the "researcher seeks to establish the overall tendency of responses from individuals and to note how this tendency varies among people" (p. 51). An obvious limitation in this study

is a mono-method bias associated with using a survey as the sole means by which to collect data. Other data collection methods were considered impractical to administer at the institutional setting under investigation. Further, surveys, in general, are the most prevalent, economical, and efficient means by which to collect a large amount of data in a reasonable amount of time (Church & Waclawski, 1998; Falletta, 2008; Fowler, 2009; Kraut, 1996). This is supported by Maronick (2009) who purported, "online research continues its headlong march to become one of the most dominant (if not the most dominant) data collection methodology worldwide" (p. 18). Additionally, it is argued a mixed methods study involving both quantitative and qualitative data collection would not be feasible for a single researcher to perform coupled with the time and institutional research constraints (Johnson & Onwuegbuzie, 2004).

Research Methods

As mentioned previously, the study employed a quantitative survey method involving the administration of a valid and reliable survey instrument to four participant groups representing different generations at the same point in time. Such a design was appropriate since the focus was on single groups of students, faculty, administrators and IT staff rather than two or more groups as in an experiment (Creswell, 2008). The *CDW-G 21st-Century Campus Assessment Tool* (CDW-G, 2011) was selected as the electronic questionnaire after a careful review of other survey instruments described in the literature on technology adoption in an educational setting (Agarwal & Prasad, 1998; Creswell, 2008; Demuth, 2010; Mills & Tincher, 2003; Sahin & Thompson, 2006). These instruments are available to colleges to measure attitudes and behaviors toward technology adoption. The tool developed by CDW-G was designed to be adopted by

local users and was targeted to the participants of interest to this study, namely students, faculty, administrators, and IT staff. The *CDW-G 21st-Century Campus Assessment Tool* collects information on the role of technology in higher education. The instrument has been administered nationally for the past four years to more than 4,000 college students, faculty, administrators, and IT staff to understand their perceptions of campus technology. The instrument was first administered in 2008 and provided a baseline for campus technology use. The results, according to CDW-G (2010), are used to determine how the expectations of today's college students will further advance the 21st-century campus. With only 16% of the national sample size drawing from community colleges and vocational technical schools, the findings of this study will add to the knowledge base of better understanding the perceptions of campus technology in the community colleges.

Participants were asked to participate in this study by way of an email. They were told their participation in the study would help inform future technology planning and adoption in the district. The identity of the respondents was anonymous. The results were delivered electronically and statistical analysis of the data aligned with the research questions being studied.

Stages of Data Collection

Creswell (2008) suggested one should first consider whether a survey instrument is already available to measure the variables in the study (p. 397). The first planning step to take place was a review of the selected survey instrument to ensure all questions and answer options were relevant to the institution's technology program and the measuring of the variables in this study. After modifications of the existing instruments were made,

they were vetted with others in the organization prior to administration. Next, the four individual surveys were programmed into the online survey tool, www.surveymonkey.com (see Appendices B-E). Finally, participants were sent an email by the District's Help Desk through the normal email system by which the organization corresponds with the target populations (see Appendix F). After the computer-assisted survey was emailed to the target populations, participants were asked to respond to the survey using the internet URL. Two weeks after the first mailing, a second mailing was sent to participants who had not responded (see Appendix G). Figure 2 shows a four-step procedure for this study.

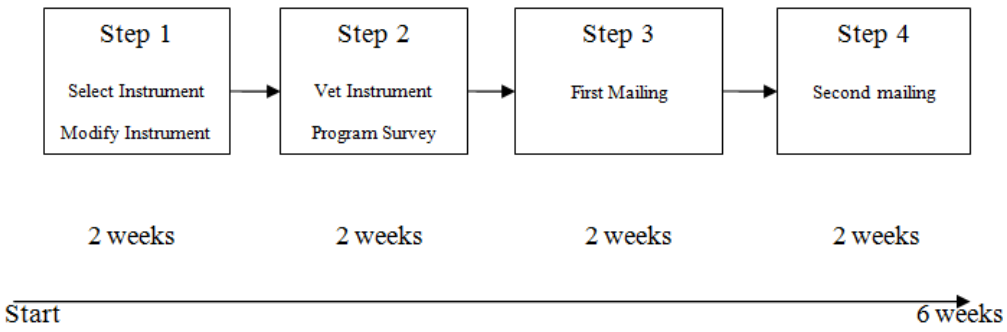

Figure 2. Four-phase survey administration schedule.

Description of Method Used

Instrument description. *The CDW-G 21st Century Campus Assessment Tool* contains four separate surveys – one for each respondent group. After an expert review by the District's survey researchers, the survey was modified to ensure the greatest likelihood for completion. The student survey consisted of 29 questions, and included

seven demographic items to gather information on the college of attendance, age, ethnicity, and gender of the students. The faculty survey consisted of 30 questions, seven of which were demographic items to gather information on the college of employment, age, ethnicity, gender, and full- or part-time status of the faculty. The administrator survey consisted of 19 questions, and included five demographic items to gather information on the college of employment, age, ethnicity, and gender of the administrators. The IT survey consisted of 26 questions, five of which were demographic items to gather information on the college of employment, age, ethnicity, and gender of the IT staff. It is important to note the data from this survey were based on self-reports rather than behavioral observations or other measures.

Participant selection. A sample from the large student population was collected using probability sampling procedures. These procedures provide a reasonable assurance, "within the limits of sampling variation, that what is found in the sample holds in the population" (Light, Singer, & Willett, 1990, p. 187). Due to the inability to access any demographic information housed in the employee record system, all professional staff from the remaining participant groups were invited to participate in the study.

Students. There were approximately 85,000 students enrolled at LRCCD. They represent a broad range of ethnicities, age, and gender, and are enrolled in day, evening, and online courses. Students younger than 18 years of age were removed from the student population group. The minimum sample size for this group at a 95% confidence interval is 393. Assuming a 25% response rate, which is within range for unsolicited survey research (Maronick, 2009), the sample size for this group of participants was quadrupled (n = 1572) to ensure the data obtained represented the population under study.

This group received the version of *The CDWG 21st Century Campus Assessment Tool* designed for students.

Faculty. There were 990 full-time faculty employed and 1161 part-time faculty at LRCCD. They represented a broad range of ethnicities, age, gender, and years of service to the district. Due to the inability to access any demographic information housed in the employee record system, all faculty were invited to participate in the study. This group received the version of *The CDWG 21st Century Campus Assessment Tool* designed for faculty members.

Administration and information technology staff. There were 116 administrative personnel and 99 information technology staff at LRCCD, ranging from front line program administrators, mid-level managers, to executive administrators. Given the relatively small size of these two groups, and the inability to access any demographic information housed in the employee record system, all administrative personnel and IT staff members were invited to participate in the study. They received the version of *The CDWG 21st Century Campus Assessment Tool* for IT Staff and administrators, respectively.

Identification and invitation. An e-mail invitation to participate was sent to all participants (students, faculty, administrators, and IT staff), including an embedded URL to the survey. An e-mail reminder was sent to all participants after two weeks, which is deemed likely to enhance overall response rate in internet surveys (Maronick, 2009).

Data collection. As mentioned earlier, *The 21st Century Campus Assessment Tool* was used as the data collection instrument and administered to all participant groups through Survey Monkey, a vendor proprietary web-based tool.

Data analysis. Descriptive statistics were performed using frequency distributions and percentages, and chi-square analysis. Differences between group comparisons were made among the participant groups as well as cross tabulations on various demographic variables. The data obtained were analyzed and interpreted in relation to the theoretical frameworks described in Chapter 2.

Ethical Considerations

As this study presented minimal risk of harm to the subject and the research involved no procedures requiring consent outside of the context of participation in the research study, the research was reviewed and approved through Drexel University's IRB process and by the district's research review committee. Informed consent was obtained prior to the participants being able to begin the internet survey. Informed consent included a written statement of the basic elements of consent followed by the statement, "Click "Exit this survey" if you do not want to complete the survey." Additionally, a brief summary of the research methodology was provided and the participants were assured of their anonymity, apprised their responses would be used as part of a research study, and informed their perceptions about campus technology would provide a starting point for the district to evaluate the community's needs and develop a path forward. Further, participants were assured ongoing consent by being provided an opportunity to answer a question with a "no response" option, and a button labeled as "Exit this survey," allowing the participant to withdraw from the survey at any point in time. In this way, participants were able to proceed to the next question or withdraw completely from the study. Efforts were made before the first email message was sent out to cull out students

younger than 18 years of age so as not to risk the ability of minors participating without parental consent.

Chapter 4: Findings and Results

Introduction

This chapter describes the data collection components, the data gathering instruments, and the sample, followed by an analysis of the quantitative data. The purpose of this study was to determine if the perceptions and expectations surrounding technology differed by students, faculty, administrators, and information technology staff and whether there were significant generational differences among survey participants. The researcher believed a better understanding of these differences would allow educators to make more informed decisions and changes to business practices related to technology adoption. The information gathered from this survey data pertains to individual perceptions and expectations surrounding technology usage and not actual behavior, and as such should not be used to predict the behavior of future generations.

The following results are drawn from the data collected through the administration of the *CDW-G 21st Century Campus Assessment Tool* (CDW-G, 2011), modified to ensure all questions and answer options were relevant to the organization under investigation. The specific survey questions included Likert-type scales (very important to not important), multiple response, and open-ended response alternatives. An e-mail including the survey link was sent out to each participant group and was available for approximately four weeks at the Survey Monkey website. A follow-up email reminder to participate was sent two weeks after the initial invitation in an effort to increase response rates, which, according to Roth and BeVier (1998) is one of four significant variables affecting internet survey response rates. In terms of survey

responses, 442 respondents participated in the study, including 186 students, 199 faculty, 28 administrators, and 29 information technology staff. This chapter is organized into three main sections: a) a summary of the descriptive analysis of the survey responses, b) a review of the results in support of the two research questions, and c) a summary of the data collection.

Findings

The following section provides a breakdown of the 442 survey respondents. Descriptive statistics were used to identify key findings for each of the four participant groups and to identify generational differences within and between groups.

Response Rate

The four community colleges that participated in the study were from one college district in Northern California. The online survey was distributed to four different groups: a) students, b) faculty, c) administrators, and d) information technology staff. Four hundred forty-two completed surveys were received out of the 4,171 surveys disseminated, reflecting a 10.60% response rate. The data is summarized in Table 4.

Response rate – students. A random sample of all students taking courses in Spring 2012 was calculated to be 1,572. Of this sample, 186 students responded to the survey yielding a response rate of 11.83% for this group.

Response rate – faculty. All full-time and part-time faculty were invited to participate in the survey. Of a combined total of 2,384 faculty, 199 responded to the survey yielding a 8.34% response rate for this group.

Response rate – administration. All administrators were invited to participate in the survey. Of 116 administrators, 28 responded to the survey yielding a 24.13% response rate for this group.

Response rate – information technology. All information technology staff were invited to participate in the survey. Of 99 staff, 29 responded to the survey yielding a 29.29% response rate for this group.

Table 4

Summary of Survey Responses

Participant Groups	Sample size	Total responses	% within group	% of responses
Students	1572	186	11.83	42.08
Faculty	2384	199	8.34	45.02
Admin	116	28	24.13	6.30
IT	99	29	29.29	6.60
Total	4171	442	10.60	100.00

Description of Respondents

Each survey collected demographic information from the participant groups. The exact information varied depending on the group; however, all groups answered demographic questions pertaining to age, ethnicity, gender, and college site. Demographic descriptive statistics are provided and illustrate a wide range of data in each category. Of the 186 student respondents, over half the participants were between 18 and 29 years of age (Millennial), 59 (31.7%) were between 30 and 49 years of age (Gen X), and 26 (14%) were over the age of 50 (Boomer). Conversely, within the faculty sample, nearly half the participants were over 50 (Boomer), 86 (43.2%) were between 30 and 49 (Gen X), and seven (3.5%) were between 18 and 29 (Millennial). The majority of

administrators were over the age of 50 (Boomer), while 25% of the sample was between 30 and 49. The IT respondents were fairly evenly distributed between Boomer and Gen X. It is important to note that due to low numbers of professional staff aged 65 years and older (for example, less than 1.3% for all administrators), the results were categorized by the largest generational cohorts and respondents over the age of 50 were included in the Baby Boomer category (see Table 5).

Table 5

Summary of Survey Responses by Age

Group		Age				
		Baby Boomer	Gen X	Millennial	Unknown	Total
Students	Count	26	59	99	2	186
	%	14.0	31.7	53.2	1.1	100.0
Faculty	Count	99	86	7	7	199
	%	49.7	43.2	3.5	3.5	100.0
Admin	Count	18	7	0	3	28
	%	64.3	25.0	.0	10.7	100.0
IT	Count	14	13	0	2	29
	%	48.3	44.8	.0	6.9	100.0
Total	Count	157	165	106	14	442
	%	35.5	37.3	24.0	3.2	100.0

Survey participants represented a wide range of ethnicities, with the largest number of respondents, or 58.1%, self-identifying as White (n=257). More students selected multi-racial than any other group (14%, n=26) while a greater percentage of administrators (7.1%, n=2) selected multi-racial than faculty (5.5%, n= 11) and IT staff

(0%). The second largest representation among all four groups was Asian (12%, n=53) (see Table 6).

Table 6

Summary of Survey Responses by Ethnicity

Group		Ethnicity							
		Af Am	Asian	Latino	Multi	NatAm	Unknown	White	Total
Students	Count	18	36	18	26	2	7	79	186
	%	9.7	19.4	9.7	14.0	1.1	3.8	42.5	100.0
Faculty	Count	6	13	12	11	4	15	138	199
	%	3.0	6.5	6.0	5.5	2.0	7.5	69.3	100.0
Admin	Count	1	1	1	2	1	2	20	28
	%	3.6	3.6	3.6	7.1	3.6	7.1	71.4	100.0
IT	Count	1	3	2	0	0	3	20	29
	%	3.4	10.3	6.9	.0	.0	10.3	69.0	100.0
Total	Count	26	53	33	39	7	27	257	442
	%	5.9	12.0	7.5	8.8	1.6	6.1	58.1	100.0

A total of 239 respondents were female (54%) and 184 were male (41.6%). Nineteen participants declined to answer the question regarding gender (4.3%). With the exception of IT staff, more females than males responded to the survey across the remaining participant groups (see Table 7).

Table 7

Summary of Survey Responses by Gender

Group		Gender			Total
		Female	Male	Unknown	
Students	Count	114	68	4	186
	%	61.3	36.6	2.2	100.0
Faculty	Count	102	87	10	199
	%	51.3	43.7	5.0	100.0
Admin	Count	14	11	3	28
	%	50.0	39.3	10.7	100.0
IT	Count	9	18	2	29
	%	31.0	62.1	6.9	100.0
Total	Count	239	184	19	442
	%	54.1	41.6	4.3	100.0

The largest number of respondents came from the two larger colleges, ARC (33.9%, n= 150) and SCC (29.4%, n= 130). More IT staff at the District Office (DO) responded to the survey than did IT staff at the colleges: DO (44.8%, n= 13), ARC (27.6%, n= 8), FLC (13.8%, n=4), SCC (6.9%, n=2), and CRC (3.4%, n=1). The number of student and faculty participants were broadly distributed among the four campuses (see Table 8).

Table 8

Summary of Survey Responses by College

Group		College						
		No Response	ARC	CRC	DO	FLC	SCC	Total
Students	Count	1	69	31	0	29	56	186
	%	.5	37.1	16.7	.0	15.6	30.1	100.0
Faculty	Count	3	64	36	0	28	68	199
	%	1.5	32.2	18.1	.0	14.1	34.2	100.0
Admin	Count	1	9	3	8	3	4	28
	%	3.6	32.1	10.7	28.6	10.7	14.3	100.0
IT	Count	1	8	1	13	4	2	29
	%	3.4	27.6	3.4	44.8	13.8	6.9	100.0
Total	Count	6	150	71	21	64	130	442
	%	1.4	33.9	16.1	4.8	14.5	29.4	100.0

Perceptions/Expectations and Utilization of Respondents

This section highlights the key findings on how the perceptions/expectations and utilization of faculty, administrators, and information technology staff differ from those of students with regard to technology. The data is organized by question number as it appears on the Student Survey (see Appendix B). The number of respondents varies among the survey items because some respondents did not answer all the questions. A summary of the findings are provided below.

The distribution of the responses to item 2 on the Student Survey are significantly different across the four groups. For example, among college staff, IT staff regarded technology as more important when choosing employment, as almost 93% of IT staff indicated technology is at least somewhat important while 75% of administrators and

73% of faculty felt the same way. Students fell somewhat in the middle with 86% indicating technology was an important factor in their college choice (see Table 9).

Item 3 on the Student Survey revealed that while some believed the technology at their campus was cutting edge, most rated their college as adequate or as having technology that is no more than three years old: students (79.4%, n= 147), faculty (80.5%, n= 157), administrators (85.8%, n=24), and IT staff (85.7%, n= 24) (see Table 10).

Item 4 on the Student Survey asked survey participants about their expectations of a 21st century classroom. All four groups indicated wireless network/internet as one of the top five essential technologies (79%, n=349). The other essential tools by participant group are: students (wireless/internet, course management system, access to the network from home, digital content, laptop/netbook computer), faculty (wireless network/internet, access to the network from home, desktop computer, course management system, digital content), administrators (wireless network/internet, access to the network from home, desktop computer, virtual learning, smartphone), and IT staff (desktop computer, wireless/network and course management system, access to the network, laptop/netbook computer and virtual learning, recorded class lectures) (see Table 11).

Item 5 on the Student Survey revealed that while 100% of the administrators owned/used Broadband internet at home (n= 28), only 79.6% of students did (n= 148). Broadband internet usage was high for faculty (92.5%, n= 184) and IT staff (93.1%, n= 27) as well. Chi-square statistical tests of significance indicate significant differences between the four participant groups in terms of usage of smartphones, tablets, desktop computers, and electronic book devices (see Table 12).

For instance, item 6 of the Student Survey revealed Feature phones (29.2%, n= 129), Androids (27.4%, n= 121), and iPhones (27.8%, n= 123) were the dominant phones used by the four participant groups. Students used Android phones more than feature phones or iPhones, administrators and IT staff used iPhones more than features phones or Androids, and faculty used feature phones more than iPhones or Androids (see Table 13).

Most respondents had an unlimited text message plan (item 7 on the Student Survey). Three-fourths of the student respondents indicated they had an unlimited text message plan (76.3%, n= 142) compared to administrators (67.9%, n= 19), faculty (49.2%¸ n= 98), and IT staff (37.9%, n= 11) (see Table 14).

Staff had more email accounts than students and tended to keep college email separate from other email (item 8 on the Student Survey). Students reported forwarding college email to another account at greater rates than staff. The use of Gmail does not appear to have had much value to any participant group: students (25.8%, n= 48), faculty (26.6%, n= 53), administrators (28.6%, n= 8), and IT staff (31%, n= 9).

Item 11 on the Student Survey revealed that more staff than students disagreed or strongly disagreed with the statement "My college understands how students use or want to use technology as a learning tool:" students (5.9%, n= 11), faculty (14.1%, n= 28), administrators (14.3%, n=4), and IT staff (17.2%, n= 5). The majority of respondents indicated their college valued technology as a learning/teaching tool (72.9%, n= 322) and over half the respondents agreed their college was preparing students to successfully use technology as a tool in the workforce (59%, n= 261). An overwhelming majority of respondents agreed learning and mastering technology skills will improve students' educational and career opportunities in the future (91.4%, n= 404).

Table 9

Perceptions and Expectations of Respondents Question S2

S.2 When you were considering where to attend college/where to teach/where to work, how important were an institution's technology offering to you, including equipment and access to that equipment in your selection process?						
Responses		Group				Total
		Admin	Faculty	IT	Students	
Not Important	Count	7	53	2	26	88
	%	25.0	27.0	7.1	14.0	20.1
Somewhat Important	Count	6	26	8	32	72
	%	21.4	13.3	28.6	17.2	16.4
Important	Count	10	63	13	51	137
	%	35.7	32.1	46.4	27.4	31.3
Very Important	Count	5	54	5	77	141
	%	17.9	27.6	17.9	41.4	32.2
Total	Count	28	196	28	186	438
	%	100.0	100.0	100.0	100.0	100.0

Table 10

Perceptions and Expectations of Respondents Question S3

S3. How would you rate the current level of technology at your college?						
		Group				Total
		Admin	Faculty	IT	Students	
Aging or In the dark ages	Count	1	17	1	14	33
	%	3.6	8.7	3.6	7.6	7.6
Adequate, but could be refreshed	Count	12	79	14	48	153
	%	42.9	40.5	50.0	25.9	35.1
Current technology with hardware/software that is no more than three years old	Count	12	78	10	99	199
	%	42.9	40.0	35.7	53.5	45.6
Cutting edge with new/innovative technology adoption	Count	3	21	3	24	51
	%	10.7	10.8	10.7	13.0	11.7
Total	Count	28	195	28	185	436
	%	100.0	100.0	100.0	100.0	100.0

Table 11

Perceptions and Expectations of Respondents Question S4

S4. Which of the following technologies do you believe are essential to a 21st-century classroom? Which of these technologies does your college offer/support? Which of these technologies do you use in conjunction with your work or education? Please select all that apply.

			Group				
			Admin n= 28	Faculty n= 199	IT n= 29	Students n= 186	Total
Wireless network/ Internet	Essential	Count	25	163	25	136	349
		%	89.3	81.9	86.2	73.1	79.0
	College offers	Count	22	140	22	119	303
		%	78.6	70.4	75.9	64.0	68.6
	Currently use in conjunction with role	Count	16	127	18	113	274
		%	57.1	63.8	62.1	60.8	62.0
Laptop/netbook computer	Essential	Count	16	87	19	101	223
		%	57.1	43.7	65.5	54.3	50.5
	College offers	Count	17	65	13	64	159
		%	60.7	32.7	44.8	34.4	36.0
	Currently use in conjunction with role	Count	14	93	14	88	209
		%	50.0	46.7	48.3	47.3	47.3
Desktop computer	Essential	Count	20	138	26	92	276
		%	71.4	69.3	89.7	49.5	62.4
	College offers	Count	18	141	21	95	275
		%	64.3	70.9	72.4	51.1	62.2
	Currently use in conjunction with role	Count	21	138	22	88	269
		%	75.0	69.3	75.9	47.3	60.9
iPod/MP3 player	Essential	Count	3	11	3	35	52
		%	10.7	5.5	10.3	18.8	11.8
	College offers	Count	0	17	4	20	41
		%	.0	8.5	13.8	10.8	9.3
	Currently use in conjunction with role	Count	1	18	3	40	62
		%	3.6	9.0	10.3	21.5	14.0

Table 11 (continued)

			Group				
			Admin n= 28	Faculty n= 199	IT n= 29	Students n= 186	Total
E-reader device (e.g. Kindle, Nook, Sony eReader)	Essential	Count	3	18	7	43	71
		%	10.7	9.0	24.1	23.1%	16.1
	College offers	Count	0	18	5	21	44
		%	.0	9.0	17.2	11.3%	10.0
	Currently use in conjunction with role	Count	0	16	3	32	51
		%	.0	8.0	10.3	17.2	11.5
Media tablet (e.g., iPad, Samsung Galaxy)	Essential	Count	4	28	7	47	86
		%	14.3	14.1	24.1	25.3	19.5
	College offers	Count	2	11	8	24	45
		%	7.1	5.5	27.6	12.9	10.2
	Currently use in conjunction with role	Count	3	27	2	29	61
		%	10.7	13.6	6.9	15.6	13.8
Smartphone	Essential	Count	17	34	13	61	125
		%	60.7	17.1	44.8	32.8	28.3
	College offers	Count	4	19	8	27	58
		%	14.3	9.5	27.6	14.5	13.1
	Currently use in conjunction with role	Count	18	51	5	58	132
		%	64.3	25.6	17.2	31.2	29.9
Video and/or web conferencing	Essential	Count	16	61	16	60	153
		%	57.1	30.7	55.2	32.3	34.6
	College offers	Count	15	82	17	46	160
		%	53.6	41.2	58.6	24.7	36.2
	Currently use in conjunction with role	Count	16	52	10	34	112
		%	57.1	26.1	34.5	18.3	25.3
Digital Content (e.g. online books, material available online for download in electronic form)	Essential	Count	15	107	17	102	241
		%	53.6	53.8	58.6	54.8	54.5
	College offers	Count	7	84	14	84	189
		%	25.0	42.2	48.3	45.2	42.8
	Currently use in conjunction with role	Count	6	90	9	79	184
		%	21.4	45.2	31.0	42.5	41.6

Table 11 (continued)

			Group				
			Admin n= 28	Faculty n= 199	IT n= 29	Students n= 186	Total
Instant message/video chat (e.g. AIM, Gchat, Skype)	Essential	Count	11	16	9	48	84
		%	39.3	8.0	31.0	25.8	19.0
	College offers	Count	5	31	10	31	77
		%	17.9	15.6	34.5	16.7	17.4
	Currently use in conjunction with role	Count	4	24	5	30	63
		%	14.3	12.1	17.2	16.1	14.3
Open source applications (e.g. OpenOffice)	Essential	Count	7	35	9	78	129
		%	25.0	17.6	31.0	41.9	29.2
	College offers	Count	4	22	8	52	86
		%	14.3	11.1	27.6	28.0	19.5
	Currently use in conjunction with role	Count	2	35	7	52	96
		%	7.1	17.6	24.1	28.0	21.7
Social networking sites (e.g. Facebook, Twitter, MySpace)	Essential	Count	7	20	4	43	74
		%	25.0	10.1	13.8	23.1	16.7
	College offers	Count	7	27	6	39	79
		%	25.0	13.6	20.7	21.0	17.9
	Currently use in conjunction with role	Count	7	37	3	39	86
		%	25.0	18.6	10.3	21.0	19.5
Blogs/wikis	Essential	Count	5	23	11	44	83
		%	17.9	11.6	37.9	23.7	18.8
	College offers	Count	6	28	8	36	78
		%	21.4	14.1	27.6	19.4	17.6
	Currently use in conjunction with role	Count	4	35	3	34	76
		%	14.3	17.6	10.3	18.3	17.2
Podcasts/vodcasts	Essential	Count	8	35	13	39	95
		%	28.6	17.6	44.8	21.0	21.5
	College offers	Count	6	40	12	33	91
		%	21.4	20.1	41.4	17.7	20.6
	Currently use in conjunction with role	Count	4	37	4	19	64
		%	14.3	18.6	13.8	10.2	14.5

Table 11 (continued)

			Group				
			Admin n= 28	Faculty n= 199	IT n= 29	Students n= 186	Total
Course management system (e.g., D2L)	Essential	Count	16	135	25	116	292
		%	57.1	67.8	86.2	62.4	66.1
	College offers	Count	13	137	22	109	281
		%	46.4	68.8	75.9	58.6	63.6
	Currently use in conjunction with role	Count	7	111	7	100	225
		%	25.0	55.8	24.1	53.8	50.9
Access to institution's network from home or another place away from school	Essential	Count	21	155	22	111	309
		%	75.0	77.9	75.9	59.7	69.9
	College offers	Count	15	117	14	86	232
		%	53.6	58.8	48.3	46.2	52.5
	Currently use in conjunction with role	Count	16	111	12	82	221
		%	57.1	55.8	41.4	44.1	50.0
Interactive whiteboard	Essential	Count	11	29	10	55	105
		%	39.3	14.6	34.5	29.6	23.8
	College offers	Count	6	30	11	37	84
		%	21.4	15.1	37.9	19.9	19.0
	Currently use in conjunction with role	Count	1	12	2	35	50
		%	3.6	6.0	6.9	18.8	11.3
Recorded class lectures	Essential	Count	10	36	18	77	141
		%	35.7	18.1	62.1	41.4	31.9
	College offers	Count	6	32	13	48	99
		%	21.4	16.1	44.8	25.8	22.4
	Currently use in conjunction with role	Count	2	28	1	34	65
		%	7.1	14.1	3.4	18.3	14.7
Virtual learning	Essential	Count	18	79	19	82	198
		%	64.3	39.7	65.5	44.1	44.8
	College offers	Count	14	84	17	66	181
		%	50.0	42.2	58.6	35.5	41.0
	Currently use in conjunction with role	Count	3	43	4	45	95
		%	10.7	21.6	13.8	24.2	21.5

Table 11 (continued)

			Group				
			Admin n= 28	Faculty n= 199	IT n= 29	Students n= 186	Total
Multimedia Content	Essential	Count	14	70	16	72	172
		%	50.0	35.2	55.2	38.7	38.9
	College offers	Count	10	62	12	43	127
		%	35.7	31.2	41.4	23.1	28.7
	Currently use in conjunction with role	Count	3	57	6	38	104
		%	10.7	28.6	20.7	20.4	23.5

Table 12

Perceptions and Expectations of Respondents Question S5

S5. I currently own/use the following technologies. Please select all that apply.

Technology		Group				
		Admin	Faculty	IT	Students	Total
Broadband (high speed DSL/cable etc.) internet access at home.	Count	28	184	27	148	387
	%	100.0	92.5	93.1	79.6	87.6
Smartphone with data plan that allows extensive use of internet applications	Count	25	120	19	101	265
	%	89.3	60.3	65.5	54.3	60.0
Tablet computer (iPad or Galaxy tab, etc.)	Count	7	69	8	30	114
	%	25.0	34.7	27.6	16.1	25.8
Laptop or Netbook computer (very light and often low power)	Count	23	158	22	131	334
	%	82.1	79.4	75.9	70.4	75.6
Desktop computer	Count	23	176	28	117	344
	%	82.1	88.4	96.6	62.9	77.8
Electronic book device or e-Book reader, such as a Kindle or Nook	Count	10	61	6	25	102
	%	35.7	30.7	20.7	13.4	23.1
Game console (Xbox 360, PlayStation 3, PSP, Wii, 3DS, etc.)	Count	11	63	14	78	166
	%	39.3	31.7	48.3	41.9	37.6
iPod or MP3 player	Count	12	121	18	108	259
	%	42.9	60.8	62.1	58.1	58.6

Table 13

Perceptions and Expectations of Respondents Question S6

S6. What cell phone do you use?						
		Group				
		Admin	Faculty	IT	Students	Total
No Response	Count	0	12	0	18	30
	%	.0	6.0	.0	9.7	6.8
I don't use a cell phone	Count	0	2	1	10	13
	%	.0	1.0	3.4	5.4	2.9
I use a Blackberry phone	Count	3	4	1	8	16
	%	10.7	2.0	3.4	4.3	3.6
I use a feature phone (no web browser or data plan)	Count	3	67	8	51	129
	%	10.7	33.7	27.6	27.4	29.2
I use a Windows Mobile phone	Count	0	5	0	5	10
	%	.0	2.5	.0	2.7	2.3
I use an Android phone	Count	8	46	9	58	121
	%	28.6	23.1	31.0	31.2	27.4
I use an iPhone	Count	14	63	10	36	123
	%	50.0	31.7	34.5	19.4	27.8
Total	Count	28	199	29	186	442
	%	100.0	100.0	100.0	100.0	100.0

Table 14

Perceptions and Expectations of Respondents Question S7

S7. My text messaging plan is:						
		Group				
		Admin	Faculty	IT	Students	Total
No Response	Count	0	4	0	0	4
	%	.0	2.0	.0	.0	.9
I don't text message	Count	3	34	4	25	66
	%	10.7	17.1	13.8	13.4	14.9
I have an unlimited text message plan	Count	19	98	11	142	270
	%	67.9	49.2	37.9	76.3	61.1
I pay for a mid-sized amount of text message	Count	5	47	9	12	73
	%	17.9	23.6	31.0	6.5	16.5
I pay for each text message	Count	1	16	5	7	29
	%	3.6	8.0	17.2	3.8	6.6
	Count	28	199	29	186	442
	%	100.0	100.0	100.0	100.0	100.0

Table 15

Perceptions and Expectations of Respondents Question S8

S8. Please tell us about your use of email. Please select all that apply.						
Responses		Group				
		Admin	Faculty	IT	Students	Total
I don't use email	Count	0	0	0	0	0
	%	.0	.0	.0	.0	.0
I use email as little as possible	Count	0	5	2	11	18
	%	.0	2.5	6.9	5.9	4.1
I have several email accounts	Count	21	160	25	90	296
	%	75.0	80.4	86.2	48.4	67.0
I like to keep college email separate from my other email	Count	25	158	23	57	263
	%	89.3	79.4	79.3	30.6	59.5
I forward my college email to another account	Count	1	18	1	118	138
	%	3.6	9.0	3.4	63.4	31.2
If the college provided a Gmail email account, I would use it	Count	8	53	9	48	118
	%	28.6	26.6	31.0	25.8	26.7

Table 16

Perceptions and Expectations of Respondents Question S11

S11. Please indicate how strongly you agree or disagree with the following statements.							
			Group				
			Admin	Faculty	IT	Students	Total
My college understands how students use or want to use technology as a learning tool.	Disagree or Strongly disagree	Count	4	28	5	11	48
		%	14.3	14.1	17.2	5.9	10.9
	Neutral or No Response	Count	5	33	3	55	96
		%	17.9	16.6	10.3	29.6	21.7
	Agree or Strongly agree	Count	19	138	21	120	298
		%	67.9	69.3	72.4	64.5	67.4
Total		Count	28	199	29	186	442
		%	100.0	100.0	100.0	100.0	100.0
My college values technology as a learning/teaching tool.	Disagree or Strongly disagree	Count	2	15	5	11	33
		%	7.1	7.5	17.2	5.9	7.5
	Neutral or No Response	Count	8	29	4	46	87
		%	28.6	14.6	13.8	24.7	19.7
	Agree or Strongly agree	Count	18	155	20	129	322
		%	64.3	77.9	69.0	69.4	72.9
Total		Count	28	199	29	186	442
		%	100.0	100.0	100.0	100.0	100.0
My college is preparing students to successfully use technology as a business/ professional tool when I enter the workforce.	Disagree or Strongly disagree	Count	3	26	7	19	55
		%	10.7	13.1	24.1	10.2	12.4
	Neutral or No Response	Count	10	62	3	51	126
		%	35.7	31.2	10.3	27.4	28.5
	Agree or Strongly agree	Count	15	111	19	116	261
		%	53.6	55.8	65.5	62.4	59.0
Total		Count	28	199	29	186	442
		%	100.0	100.0	100.0	100.0	100.0

Table 16 (continued)

			Group				
			Admin	Faculty	IT	Students	Total
Learning and mastering technology skills will improve students' educational and career opportunities in the future.	Disagree or Strongly disagree	Count	0	2	1	4	7
		%	.0	1.0	3.4	2.2	1.6
	Neutral or No Response	Count	1	10	2	18	31
		%	3.6	5.0	6.9	9.7	7.0
	Agree or Strongly agree	Count	27	187	26	164	404
		%	96.4	94.0	89.7	88.2	91.4
Total		Count	28	199	29	186	442
		%	100.0	100.0	100.0	100.0	100.0
Technology is a critical component to students' success in college and/or when they enter the workforce.	Disagree or Strongly disagree	Count	0	3	0	0	3
		%	.0	1.5	.0	.0	.7
	Neutral or No Response	Count	1	11	2	186	200
		%	3.6	5.5	6.9	100.0	45.2
	Agree or Strongly agree	Count	27	185	27	0	239
		%	96.4	93.0	93.1	.0	54.1
Total		Count	28	199	29	186	442
		%	100.0	100.0	100.0	100.0	100.0

Note: Percentages are calculated on the count within the group for each survey item. Counts are based on the actual number of respondents who answered the question using the response options provided.

Perceptions/Expectations and Utilization of Respondents – Generational Differences

This section highlights the key findings as to whether there were generational differences within and between community college professionals and students. The focus of this review is on three generations (Boomer, Gen X, and Millennial) because, according to Reeves and Oh (2007), members of these three generations will be in higher education and the workforce over the next 15 years. The key findings from Tables 17-24 are summarized in the following pages.

Compared to Baby Boomers and Millennials, fewer Gen X (only 14.6%, n= 24) indicated technology was not important when considering where to work or attend college (item 2 on the Student Survey). Gen X is the dominant group indicating technology is important (34.8%, n= 57) or very important (37.2%, n= 61) when considering where to work or attend college (see Table 17).

Item 3 (see Table 18) on the Student Survey revealed that while some believed the technology at their campus was cutting edge (11.7%, n= 51), most rated their college as adequate or as having technology no more than three years old: Baby Boomers (83.2%, n= 128), Gen X (79.25%, n= 129), and Millennials (81.28%, n=86).

Item 4 (see Table 19) on the Student Survey asked survey participants about their expectations of a 21st-century classroom. The essential tools by participant group are: Baby Boomers (video/web conferencing, desktop computer, access to the network from home, wireless network/internet, course management system), Gen X (media tablet, blogs/wikis, multimedia content streaming, podcasts/vodcasts, e-reader device), and Millennials (iPod/MP3 player, social networking sites, e-reader device, blogs/wikis, recorded class lectures).

Item 5 (see Table 20) on the Student Survey revealed all three groups were heavy users of broadband internet access at home. Baby Boomers owned more desktop computers than Gen X and Millennials, while fewer Millennials owned iPods than Baby Boomers and Gen X. All groups ranked ownership or use of tablets, e-books, and game consoles the least. Overall, Millennials owned fewer of these devices than Baby Boomers and Generation X.

Item 6 (see Table 21) of the Student Survey revealed that Millennials favored Android phones more than feature phones or iPhones (they favored iPhones the least of all three groups) while Baby Boomers and Gen X favored iPhones more than Android. Generation X favored iPhones the most.

Most respondents had an unlimited text message plan (item 7 on the Student Survey, Table 22). Three-fourths of Millennials indicated they had an unlimited text message plan (78.3%, n= 83) compared to Baby Boomers (46.5%, n= 73), and Gen X (66.1%, n= 109). Boomers (21%, n= 33) indicated they did not text message at higher rates than Gen X (9.1%, n= 15) and Millennials (12.3%, n= 13).

More Baby Boomers and Gen X have several email accounts than Millennials and tended to keep college email separate from other email compared to Millennials (item 8 on the Student Survey). Millennials reported forwarding college email to another account at greater rates than Baby Boomers and Gen X. More than 20% would use Gmail if it were made available: Baby Boomers (21.7%, n= 34), Gen X (32.1%, n= 53), and Millennials (27.4%, n= 29) (see Table 23).

Item 11 on the Student Survey revealed that more Gen X than Baby Boomers and Millennials disagreed or strongly disagreed with the statement, "My college understands how students use or want to use technology as a learning tool:" Baby Boomers (9.6%, n= 15), Gen X (13.9%, n= 23), and Millennials (6.6%, n= 7). Gen X also disagreed or strongly disagreed at higher rates that their college values technology as a learning/teaching tool: Baby Boomers (5.7%, n= 9), Gen X (10.3%, n= 17), and Millennials (6.6%, n= 7). While there was no difference between generational cohorts about the fact that learning and mastering technology skills will improve students'

educational and career opportunities in the future (91.4%, n= 404), more Millennials did not indicate a response to technology being critical to student success in college and/or the workforce (94.3%, n= 100), reflected in the range of responses for those who agreed or strongly agreed: Baby Boomers (79%, n= 124), Gen X (60.6%, n= 100), and Millennials (5.7%, n= 6) (see Table 24).

Table 17

Perceptions and Expectations of Respondents – Generational Differences S2

S2. When you were considering where to attend college/where to teach/where to work, how important were an institution's technology offering to you, including equipment and access to that equipment in your selection process?

Responses		Age				
		Baby Boomer	Generation X	Millennial	Unknown	Total
Not Important	Count	41	24	20	3	88
	%	26.5	14.6	18.9	23.1	20.1
Somewhat Important	Count	24	22	23	3	72
	%	15.5	13.4	21.7	23.1	16.4
Important	Count	49	57	26	5	137
	%	31.6	34.8	24.5	38.5	31.3
Very Important	Count	41	61	37	2	141
	%	26.5	37.2	34.9	15.4	32.2
Total	Count	155	164	106	13	438
	%	100.0	100.0	100.0	100.0	100.0

Table 18

Perceptions and Expectations of Respondents – Generational Differences S3

S3. How would you rate the current level of technology at your college?						
		Age				
		Baby Boomer	Gen X	Millennial	Unknown	Total
Aging or In the dark ages	Count	9	16	8	0	33
	%	5.8	9.8	7.5	.0	7.6
Adequate, but could be refreshed	Count	68	51	29	5	153
	%	44.2	31.3	27.4	38.5	35.1
Current technology with hardware/software that is no more than three years old	Count	60	78	57	4	199
	%	39.0	47.9	53.8	30.8	45.6
Cutting edge with new/innovative technology adoption	Count	17	18	12	4	51
	%	11.0	11.0	11.3	30.8	11.7
Total	Count	154	163	106	13	436
	%	100.0	100.0	100.0	100.0	100.0

Table 19

Perceptions and Expectations of Respondents – Generational Differences S4

S4. Which of the following technologies do you believe are essential to a 21st-century classroom? Which of these technologies does your college offer/support? Which of these technologies do you use in conjunction with your work or education? Please select all that apply.

			Age				
			Baby Boomer n= 157	Gen X n= 165	Millennial n= 106	Unknown	Total
Wireless network/ Internet	Essential	Count	129	133	78	9	349
		%	37.0	38.1	22.3	2.6	100.0
	College offers	Count	113	111	72	7	303
		%	37.3	36.6	23.8	2.3	100.0
	Currently use in conjunction with role	Count	97	108	64	5	274
		%	35.4	39.4	23.4	1.8	100.0
Laptop/netbook computer	Essential	Count	68	94	55	6	223
		%	30.5	42.2	24.7	2.7	100.0
	College offers	Count	52	67	36	4	159
		%	32.7	42.1	22.6	2.5	100.0
	Currently use in conjunction with role	Count	70	87	48	4	209
		%	33.5	41.6	23.0	1.9	100.0
Desktop computer	Essential	Count	115	101	50	10	276
		%	41.7	36.6	18.1	3.6	100.0
	College offers	Count	101	111	57	6	275
		%	36.7	40.4	20.7	2.2	100.0
	Currently use in conjunction with role	Count	103	104	56	6	269
		%	38.3	38.7	20.8	2.2	100.0
iPod/MP3 player	Essential	Count	9	18	23	2	52
		%	17.3	34.6	44.2	3.8	100.
	College offers	Count	13	16	11	1	41
		%	31.7	39.0	26.8	2.4	100.
	Currently use in conjunction with role	Count	12	21	28	1	62
		%	19.4	33.9	45.2	1.6	100.0

Table 19 (continued)

			Age				
			Baby Boomer n= 157	Gen X n= 165	Millennial n= 106	Unknown n= 14	Total
E-reader device (e.g. Kindle, Nook, Sony eReader)	Essential	Count	17	30	24	0	71
		%	23.9	42.3	33.8	.0	100.0
	College offers	Count	11	19	13	1	44
		%	25.0	43.2	29.5	2.3	100.0
	Currently use in conjunction with role	Count	8	17	24	2	51
		%	15.7	33.3	47.1	3.9	100.0
Media tablet (e.g., iPad, Samsung Galaxy)	Essential	Count	20	39	25	2	86
		%	23.3	45.3	29.1	2.3	100.0
	College offers	Count	11	16	16	2	45
		%	24.4	35.6	35.6	4.4	100.0
	Currently use in conjunction with role	Count	16	26	17	2	61
		%	26.2	42.6	27.9	3.3	100.0
Smartphone	Essential	Count	36	52	34	3	125
		%	28.8	41.6	27.2	2.4	100.0
	College offers	Count	21	19	16	2	58
		%	36.2	32.8	27.6	3.4	100.0
	Currently use in conjunction with role	Count	39	59	32	2	132
		%	29.5	44.7	24.2	1.5	100.0
Video and/or web conferencing	Essential	Count	66	51	31	5	153
		%	43.1	33.3	20.3	3.3	100.0
	College offers	Count	69	59	27	5	160
		%	43.1	36.9	16.9	3.1	100.0
	Currently use in conjunction with role	Count	48	39	21	4	112
		%	42.9	34.8	18.8	3.6	100.0
Digital Content (e.g. online books, material available online for download in electronic form)	Essential	Count	85	93	57	6	241
		%	35.3	38.6	23.7	2.5	100.0
	College offers	Count	66	71	50	2	189
		%	34.9	37.6	26.5	1.1	100.0
	Currently use in conjunction with role	Count	59	72	51	2	184
		%	32.1	39.1	27.7	1.1	100.0

Table 19 (continued)

			Age				
			Baby Boomer n= 157	Gen X n= 165	Millennial n= 106	Unknown n= 14	Total
Instant message/video chat (e.g. AIM, Gchat, Skype)	Essential	Count	21	33	29	1	84
		%	25.0	39.3	34.5	1.2	100.0
	College offers	Count	19	34	21	3	77
		%	24.7	44.2	27.3	3.9	100.0
	Currently use in conjunction with role	Count	16	27	18	2	63
		%	25.4	42.9	28.6	3.2	100.0
Open source applications (e.g. OpenOffice)	Essential	Count	27	52	47	3	129
		%	20.9	40.3	36.4	2.3	100.0
	College offers	Count	20	33	31	2	86
		%	23.3	38.4	36.0	2.3	100.0
	Currently use in conjunction with role	Count	27	38	29	2	96
		%	28.1	39.6	30.2	2.1	100.0
Social networking sites (e.g. Facebook, Twitter, MySpace)	Essential	Count	15	28	30	1	74
		%	20.3	37.8	40.5	1.4	100.0
	College offers	Count	21	31	23	4	79
		%	26.6	39.2	29.1	5.1	100.0
	Currently use in conjunction with role	Count	26	36	23	1	86
		%	30.2	41.9	26.7	1.2	100.0
Blogs/wikis	Essential	Count	18	37	28	0	83
		%	21.7	44.6	33.7	.0	100.0
	College offers	Count	21	31	20	6	78
		%	26.9	39.7	25.6	7.7	100.0
	Currently use in conjunction with role	Count	19	34	22	1	76
		%	25.0	44.7	28.9	1.3	100.0
Podcasts/vodcasts	Essential	Count	29	41	24	1	95
		%	30.5	43.2	25.3	1.1	100.0
	College offers	Count	32	35	20	4	91
		%	35.2	38.5	22.0	4.4	100.0
	Currently use in conjunction with role	Count	24	28	12	0	64
		%	37.5	43.8	18.8	.0	100.0

Table 19 (continued)

			Age				
			Baby Boomer n= 157	Gen X n= 165	Millennial n= 106	Unknown n= 14	Total
Course management system (e.g., D2L)	Essential	Count	106	112	67	7	292
		%	36.3	38.4	22.9	2.4	100.0
	College offers	Count	97	106	70	8	281
		%	34.5	37.7	24.9	2.8	100.0
	Currently use in conjunction with role	Count	71	89	61	4	225
		%	31.6	39.6	27.1	1.8	100.0
Access to institution's network from home or another place away from school	Essential	Count	120	118	61	10	309
		%	38.8	38.2	19.7	3.2	100.0
	College offers	Count	83	94	49	6	232
		%	35.8	40.5	21.1	2.6	100.0
	Currently use in conjunction with role	Count	82	87	47	5	221
		%	37.1	39.4	21.3	2.3	100.0
Interactive whiteboard	Essential	Count	32	38	32	3	105
		%	30.5	36.2	30.5	2.9	100.0
	College offers	Count	24	35	20	5	84
		%	28.6	41.7	23.8	6.0	100.0
	Currently use in conjunction with role	Count	11	18	20	1	50
		%	22.0	36.0	40.0	2.0	100.0
Recorded class lectures	Essential	Count	38	51	45	7	141
		%	27.0	36.2	31.9	5.0	100.0
	College offers	Count	24	44	28	3	99
		%	24.2	44.4	28.3	3.0	100.0
	Currently use in conjunction with role	Count	19	21	24	1	65
		%	29.2	32.3	36.9	1.5	100.0
Virtual learning	Essential	Count	70	79	42	7	198
		%	35.4	39.9	21.2	3.5	100.0
	College offers	Count	62	77	38	4	181
		%	34.3	42.5	21.0	2.2	100.0
	Currently use in conjunction with role	Count	30	42	22	1	95
		%	31.6	44.2	23.2	1.1	100.0

Table 19 (continued)

			Age				
			Baby Boomer n= 157	Gen X n= 165	Millennial n= 106	Unknown n= 14	Total
Multimedia Content	Essential	Count	52	75	39	6	172
		%	30.2	43.6	22.7	3.5	100.0
	College offers	Count	36	62	25	4	127
		%	28.3	48.8	19.7	3.1	100.0
	Currently use in conjunction with role	Count	31	44	27	2	104
		%	29.8	42.3	26.0	1.9	100.0

Table 20

Perceptions and Expectations of Respondents – Generational Differences S5

S5. I currently own/use the following technologies. Please select all that apply.						
Technology		Age				Total
		Baby Boomer	Gen X	Millennial	Unknown	
Broadband (high speed DSL/cable etc.) internet access at home.	Count	149	148	80	10	387
	%	94.9	89.7	75.5	71.4	87.6
Smartphone with data plan that allows extensive use of internet applications	Count	92	110	59	4	265
	%	58.6	66.7	55.7	28.6	60.0
Tablet computer (iPad or Galaxy tab, etc.)	Count	42	51	17	4	114
	%	26.8	30.9	16.0	28.6	25.8
Laptop or Netbook computer (very light and often low power)	Count	115	133	76	10	334
	%	73.2	80.6	71.7	71.4	75.6
Desktop computer	Count	136	131	66	11	344
	%	86.6	79.4	62.3	78.6	77.8
Electronic book device or e-Book reader, such as a Kindle or Nook	Count	39	42	18	3	102
	%	24.8	25.5	17.0	21.4	23.1
Game console (Xbox 360, PlayStation 3, PSP, Wii, 3DS, etc.)	Count	36	73	54	3	166
	%	22.9	44.2	50.9	21.4	37.6
iPod or MP3 player	Count	84	97	72	6	259
	%	53.5	58.8	67.9	42.9	58.6

Table 21

Perceptions and Expectations of Respondents – Generational Differences S6

S6. What cell phone do you use?						
Responses		Age				
		Baby Boomer	Gen X	Millennial	Unknown	Total
No Response	Count	6	11	12	1	30
	%	3.8	6.7	11.3	7.1	6.8
I don't use a cell phone	Count	4	4	4	1	13
	%	2.5	2.4	3.8	7.1	2.9
I use a Blackberry phone	Count	6	8	2	0	16
	%	3.8	4.8	1.9	.0	3.6
I use a feature phone (no web browser or data plan)	Count	51	42	28	8	129
	%	32.5	25.5	26.4	57.1	29.2
I use a Windows Mobile phone	Count	3	3	4	0	10
	%	1.9	1.8	3.8	.0	2.3
I use an Android phone	Count	37	43	38	3	121
	%	23.6	26.1	35.8	21.4	27.4
I use an iPhone	Count	50	54	18	1	123
	%	31.8	32.7	17.0	7.1	27.8
Total	Count	157	165	106	14	442
	%	100.0	100.0	100.0	100.0	100.0

Table 22

Perceptions and Expectations of Respondents – Generational Differences S7

S7. My text messaging plan is:						
		Age				
		Baby Boomer	Gen X	Millennial	Unknown	Total
No Response	Count	1	1	1	1	4
	%	.6	.6	.9	7.1	.9
I don't text message	Count	33	15	13	5	66
	%	21.0	9.1	12.3	35.7	14.9
I have an unlimited text message plan	Count	73	109	83	5	270
	%	46.5	66.1	78.3	35.7	61.1
I pay for a mid-sized amount of text message	Count	37	26	7	3	73
	%	23.6	15.8	6.6	21.4	16.5
I pay for each text message	Count	13	14	2	0	29
	%	8.3	8.5	1.9	.0	6.6
Total	Count	157	165	106	14	442
	%	100.0	100.0	100.0	100.0	100.0

Table 23

Perceptions and Expectations of Respondents – Generational Differences S8

S8. Please tell us about your use of email. Please select all that apply.						
Responses		Age				Total
		Baby Boomer	Gen X	Millennial	Unknown	
I don't use email	Count	0	0	0	0	0
	%	.0	.0	.0	.0	.0
I use email as little as possible	Count	9	4	4	1	18
	%	5.7	2.4	3.8	7.1	4.1
I have several email accounts	Count	113	119	55	9	296
	%	72.0	72.1	51.9	64.3	67.0
I like to keep college email separate from my other email	Count	118	99	37	9	263
	%	75.2	60.0	34.9	64.3	59.5
I forward my college email to another account	Count	22	48	66	2	138
	%	14.0	29.1	62.3	14.3	31.2
If the college provided a Gmail email account, I would use it	Count	34	53	29	2	118
	%	21.7	32.1	27.4	14.3	26.7

Table 24

Perceptions and Expectations of Respondents – Generational Differences S11

S11. Please indicate how strongly you agree or disagree with the following statements.							
Responses			Age				
			Baby Boomer	Gen X	Millennial	Unknown	Total
My college understands how students use or want to use technology as a learning tool.	Disagree or Strongly disagree	Count	15	23	7	3	48
		%	9.6	13.9	6.6	21.4	10.9
	Neutral or No Response	Count	33	31	31	1	96
		%	21.0	18.8	29.2	7.1	21.7
	Agree or Strongly agree	Count	109	111	68	10	298
		%	69.4	67.3	64.2	71.4	67.4
Total		Count	157	165	106	14	442
		%	100.0	100.0	100.0	100.0	100.0
My college values technology as a learning/teaching tool.	Disagree or Strongly disagree	Count	9	17	7	0	33
		%	5.7	10.3	6.6	.0	7.5
	Neutral or No Response	Count	28	30	26	3	87
		%	17.8	18.2	24.5	21.4	19.7
	Agree or Strongly agree	Count	120	118	73	11	322
		%	76.4	71.5	68.9	78.6	72.9
Total		Count	157	165	106	14	442
		%	100.0	100.0	100.0	100.0	100.0
My college is preparing students to successfully use technology as a business/ professional tool when I enter the workforce.	Disagree or Strongly disagree	Count	17	22	15	1	55
		%	10.8	13.3	14.2	7.1	12.4
	Neutral or No Response	Count	39	51	30	6	126
		%	24.8	30.9	28.3	42.9	28.5
	Agree or Strongly agree	Count	101	92	61	7	261
		%	64.3	55.8	57.5	50.0	59.0
Total		Count	157	165	106	14	442
		%	100.0	100.0	100.0	100.0	100.0

Table 24 (continued)

Responses			Age				
			Baby Boomer	Gen X	Millennial	Unknown	Total
Learning and mastering technology skills will improve students' educational and career opportunities in the future.	Disagree or Strongly disagree	Count	3	2	1	1	7
		%	1.9	1.2	.9	7.1	1.6
	Neutral or No Response	Count	9	9	11	2	31
		%	5.7	5.5	10.4	14.3	7.0
	Agree or Strongly agree	Count	145	154	94	11	404
		%	92.4	93.3	88.7	78.6	91.4
Total		Count	157	165	106	14	442
		%	100.0	100.0	100.0	100.0	100.0
Technology is a critical component to students' success in college and/or when they enter the workforce.	Disagree or Strongly disagree	Count	0	1	0	2	3
		%	.0	.6	.0	14.3	.7
	Neutral or No Response	Count	33	64	100	3	200
		%	21.0	38.8	94.3	21.4	45.2
	Agree or Strongly agree	Count	124	100	6	9	239
		%	79.0	60.6	5.7	64.3	54.1
Total		Count	157	165	106	14	442
		%	100.0	100.0	100.0	100.0	100.0

Results

The design of the study involved the use of descriptive statistics to investigate two research questions. To investigate the first research question, data were organized in frequency distribution tables for all survey items that appeared across all four surveys. This, according to Ravid (2011), is one way to effectively organize numerical data. Data were analyzed using the chi-square test, which determined if the responses were significantly different among the four participant groups. The observed frequencies were compared to expected frequencies and the computed chi-square was evaluated to

determine whether it was statistically significant. A p-value of less than 0.05 indicted the responses of the four groups were significantly different, or conversely if the p-value was greater than 0.05, then the responses of the four groups were not significantly different, though it was not concluded the responses were the same across four groups. The second research question was also studied using a frequency distribution for each of the survey items appearing on all four surveys. This approach allows the researcher to establish the overall tendency of responses from individuals and the variation among members of each cohort. This quantitative inquiry supports the general approach to this study, which is to explain how perceptions and expectations differ among and between groups of individuals.

Research Question One

Question 1: How do the perceptions/expectations and utilization surrounding technology held by faculty, administrators, and information technology staff of a multi-college community college district differ from students?

Each of the respondents answered questions specific to their participant group, although eight questions appeared across all four surveys. While all questions were analyzed to answer this research question, a chi-square test was performed to see if the opinions among students, faculty, administrator, and IT staff were significantly different on the eight survey items. The findings in Table 25 illustrate the results of the chi-square tests. The chi-square test is not reliable for some items due to insufficient cell counts.

Table 25

Analysis of Chi-Square Tests

Survey Item	Value	df	p
S2: Tech offer	27.988	9	.001**
S3: Rate tech	14.791	9	.097
S4: Technology			
Wireless network/Internet-	7.576	3	0.056
Laptop/netbook computer-	7.846	3	0.049*
Desktop/MP3 player-	27.529	3	0.000**
iPod/MP3 player-	16.456 [1]	3	0.001**
E-reader device-	16.132 [1]	3	0.001**
Media tablet-	8.577	3	0.035*
Smartphone-	32.603	3	0.000**
Video and/or web conferencing-	13.53	3	0.004**
Digital Content-	0.26	3	0.967
Instant message/video chat-	31.341	3	0.000**
Open source applications-	27.866	3	0.000**
Social networking sites-	13.369 [1]	3	0.004**
Blogs/wikis-	16.694	3	0.001**
Podcasts/vodcasts-	12.018	3	0.007**
Course management system-	7.657	3	0.054
Access to the institution's network away from school-	16.115	3	0.001**
Interactive whiteboard-	18.307	3	0.000**
Recorded class lectures-	37.53	3	0.000**
Virtual learning-	11.465	3	0.009**
Multimedia Content-	5.846	3	0.119
S5: Own/use			
Broadband	20.084 [1]	3	.000**
Smartphone	12.893	3	.005**
Tablet	17.333	3	.001**
Laptop/netbook	4.896	3	.180
Desktop	43.196	3	.000**
e-book	18.776	3	.000**
Game console	5.929	3	.115
iPod	3.425	3	.331

Table 25 (continued)

Survey Item	Value	df	p
S6: Cell phone	39.097 [1]	18	.003**
S7: Text message	50.071 [1]	12	.000**
S8: Email			
Use	4.635 [1]	3	.201
Several	50.934	3	.000**
Separate	111.992	3	.000**
Forward	155.877	3	.000**
Gmail	.405	3	.939
S11: Tech			
Use	39.395	6	.008**
Values	24.614	6	.055
Preparing	21.499	6	.145
Future	15.195 [1]	6	.446
Success	453.119 [1]	6	.000**

Note: * indicates significance at 0.05.
** indicates significance at 0.01.
[1]Chi-square test may not be reliable as more than 20% cells have expectant counts of less than 5.

Significant differences across the four participant groups were found for the following survey items: (a) when considering the importance of an institution's technology offerings in selecting a college to attend or work (S2); (b) in terms of who owns or uses various technologies including smartphones, tablets, desktop computers, and e-books (S5); (c) in terms of email usage in the following areas: having several accounts, keeping college email separate from other email, and forwarding college email to another account (S8); and (d) with regard to the perceptions held on the college understanding how students use or want to use technology as a learning tool (S11).

Research Question Two

Question 2: *In terms of technology perceptions/expectations and utilization, are there significant generational differences within and between various community college professionals and students?*

Cross-tabulation results for the three generations under investigation reveal a number of differences as previously discussed in the Findings section. Table 5 reports the summary of survey respondents by age. Nearly 85% of student respondents were Millennials (53.2%) and Gen X (31.7), nearly half the faculty sample was Boomers (49.7%) and 43.2% was Gen X, and the majority of administrators were Boomers (64.3%) and Gen X (25%). The IT respondents were fairly evenly distributed among Boomers (48.3%) and Gen X (44.8%). Professional staff, then were Boomers and Gen X, while student respondents were predominantly Millennials and Gen X. Key findings across the three generational groups include the following:

- campus technology matters most to Gen X when considering where to work or attend college (S2);
- campus technology is perceived as adequate (or as having technology that is no more than three years old) by all three generations (S3); expectations of a 21st-century classroom varied across all generational groups with Boomers rating virtual learning resources high on the list of essential technologies (video/web conferencing, desktop computer, access to the network from home, wireless network/internet, course management system), Gen X and Millennials prefer interactive technology (media tablet, blogs/wikis, multimedia content streaming, podcasts/vodcasts, e-reader device and iPod/MP3 player, social networking sites, e-reader device, blogs/wikis, recorded class lectures, respectively) (S4);
- keeping students and employees connected is important as 87.6% of all respondents have internet access at home, though Millennials own fewer devices than Baby Boomers and Generation X (S5);

- more Baby Boomers and Gen X favored iPhones than Android, while Millennials favored Android more than iPhone (S6);
- Boomers text message less and fewer have unlimited text message plans than Gen X and Millennials (S7);
- Millennials forward their college email to another account, while Baby Boomers and Gen X have several email accounts and tend to keep college email separate from other email compared (S8).

Finally, in general, the generations share similar perceptions about technology and how it is used or is valued at the colleges and agree mastering technology will improve students' future educational and career opportunities (S11). One exception is observed in the Millennials' responses to technology being critical to student success in college and/or when they enter the workforce. Ninety-four percent (n= 100) responded neutral or did not respond to this item. Only 5.7% of the Millennials agreed or strongly agreed with this statement compared to Baby Boomers (79%, n= 124) and Gen X (60.6%, n= 100).

Summary

In this chapter, an introduction was given regarding the survey administration procedures and the descriptive statistics used to analyze survey results. This was followed by a summary of response rates for the 442 survey participants, which included a demographic analysis of the sample presented in frequency distribution tables by age, ethnicity, gender, and college. A descriptive analysis of eight survey items that appeared on all four survey instruments was presented in the order of their appearance on the Student Survey in frequency distribution tables. Results were organized by research question.

Results from the first quantitative research question revealed the perceptions/ expectations held by faculty, administrators, and information technology staff regarding campus technology and the importance of technology to learning and student success do differ from those of students. Additionally, the use of technology devices and email also differ between these groups. Notable differences were observed for the different generations in both perception and utilization of different technologies, the implications for which are elaborated upon in the next chapter.

Chapter 5: Interpretation, Conclusions, and Recommended Actionable Solution

In the preceding chapter, the resultant data and analysis were reported. This chapter is organized into four main sections: (a) a discussion of the findings based on the research and the literature review, (b) conclusions addressing the research questions, (c) recommendations for future research, and (d) a summary synthesizing the purpose and scope of this investigation.

Interpretation of Findings & Results

The sample included 4,171 total participants, of which 442 respondents participated in the study for an overall response rate of 10.60% (i.e., 186 students, 199 faculty, 28 administrators, and 29 IT staff). A sample of students was randomly selected from a computer database of approximately 85,000 students for the quantitative sample. Only students who were previously enrolled in the prior term were included in the sample. Students who were younger than 18 years old were excluded. All professional staff from the employee groups identified were included. Incentives, according to Maronick (2009) are also likely to drive up response rates, but none were used in this study. Although the response rate seems rather low, this is not atypical of internet survey research, according to a number of studies on this topic (Cook, Heath, & Thompson, 2000; Couper, 2000; Hesser, 2008; Manfreda & Vehovar (2004); Roster, Rogers, Albaum, & Klein, 2004).

A demographic breakdown was provided for age, ethnicity, gender, and college site. Results were drawn from the data collected through the administration of the modified *CDW-G 21st Century Campus Assessment Tool*. The study included two

research questions: Question 1: How do the perceptions/expectations and utilization surrounding technology held by faculty, administrators, and information technology staff of a multi-college community college district differ from students? and Question 2: In terms of technology perceptions/expectations and utilization, are there significant generational differences within and between various community college professionals and students?

Previous research suggests the proliferation of technology has fundamentally transformed the traditional model of American education and virtually every aspect of daily life (U.S. Department of Education, 2010; Van Der Werf & Sabatier, 2009). This singularity has highlighted, for educators intent on educational reform, that today's students are not the people for which our educational systems were designed (Altbach et al., 2005; Kurzweil, 2005; Prensky, 2001). The ubiquitous presence of technology in the lives of many of today's college students has changed the way they think and learn. Yet many who teach and lead do so in workplaces designed for the last century, not the one in which we live (CDW Government, 2008; Davidson & Goldberg, 2010). The pace of change and availability of technology and information has put pressure on institutions of higher education to become more digital and responsive to today’s generation, one that has integrated technology into their daily lives. The innovations and how they are diffused and adopted throughout the organization is largely affected by the personal characteristics of the adopters. As such, the research streams in Chapter 2 suggest the study of technology acceptance and usage from a systems perspective, which provides a context from which to better understand the influence of human behavior on innovation decisions and different approaches to education and training. The goal of this study was

to investigate the extent to which perceptions and expectations in regard to technology differ among students, faculty, IT staff, and administrators at a large community college district in Northern California. Generational differences were examined as a variable of interest. The next section discusses the implications of the findings for each of the two research questions.

Research Question One

Question 1: *How do the perceptions/expectations and utilization surrounding technology held by faculty, administrators, and information technology staff of a multi-college community college district differ from students?*

Although much of the body of scholarly research surrounding technology adoption and utilization tends to focus on one group of participants as opposed to looking at differences across groups such as was done in this study, there appears to be some connection between the findings in this study to the literature presented in Chapter 2. Sahin and Thompson (2006) conducted research on 157 higher education faculty with an instrument intended to measure the level of faculty computer use for instructional purposes. Mills and Tincher (2003) also focused on faculty utilization of technology. Both of these studies yielded data that was used to better understand the skill sets of faculty and how professional development can be used to enhance and increase technology adoption. In a more expanded study, Demuth (2010) studied faculty, staff, and students and found respondents' perceptions about technology are related to technology adoption. The final relevant study to this research question was Agarwal and Prasad (1998) who found personal innovativeness influences technology acceptance and adoption. These four studies highlight the importance individual differences have on the process of technology acceptance or adoption. Overall, there were several areas that

revealed differences between the participant groups, which may potentially impact the college.

Perceptions/Expectations. The four survey items reflecting the perceptions and expectations of the respondents are discussed.

Perception 1 – College and workplace choice *(S2)* Findings suggested students perceived, at higher rates than professional staff, the technology offerings at a college are very important in influencing their college choice. Within the employee groups, IT staff regarded technology as more important when choosing employment compared to administrators and faculty.

These findings are reflected in an annual study conducted by Project Tomorrow, which provides a national survey on the views of over 1.85 million K-12 students, teachers administrators, and parents on issues of education, technology, 21st-century skills and schools of the future (Project Tomorrow, 2010). They found students reported the lack of technology in schools was holding them back. High school students also say that technology was vital to their education now and in the future, with 94% of students in another survey sample indicating they anticipate using technology to complete assignments in college (CDW-G, 2010b). They were looking for classroom environments that mirror the way they live their lives outside school. Similarly, it is not surprising IT staff in higher education are drawn to ever changing and fast-paced work environments (Beverage, 2003). IT professionals are often on the front line of new technologies but are constrained by the slower paced discussions and governance structures characterizing higher education.

Perception 2– Rating campus technology (S3). Findings suggest faculty members, administrators, and information technology staff share the same perceptions as students regarding what they say about the level of technology at their campuses. While few ranked their college technology programs as cutting edge, many concurred it was adequate and/or at least current with hardware and software.

In an environment of dwindling resources and aging infrastructures, how the colleges are offering instructional support through a variety of technologies is the subject of many statewide faculty discussion papers (Academic Senate for California Community Colleges, 1997; Academic Senate for California Community Colleges, 2000b; Academic Senate for California Community Colleges, 2002; Academic Senate for California Community Colleges, 2008). While guidelines for California's community colleges describe minimum standards for technology, including faculty offices, college websites, online course support and campus classrooms, many colleges struggle to provide adequate infrastructure to support ongoing changes in educational technology (Academic Senate for California Community Colleges, 2000a). It is a positive finding that all participant groups perceived their colleges and workplace to be providing a level of technology that is current. Some of the technologies present on the campuses that might serve as the point of reference for this perception include: faculty offices outfitted with current computer hardware and software, connectivity to library systems and student records systems, online course support, campus computer labs, campus classrooms/labs with hands-on instruction, media stations for demonstration, internet access videoconferencing capability, computer projectors, and a whole host of technology support services for faculty, staff, and students. While each of the four colleges have

relatively the same resources to support their technology plans, and information technology is coordinated district wide, there may be varying levels of support at each of the campuses due to the age of facilities and overall budget reductions, the impact of which has affected community colleges more than they have four-year colleges and universities (Green, 2010).

Perception 3 – Essential technologies for the 21st-century classroom (S4). Students, faculty members, administrators, and IT staff alike say connectivity to the wireless network is essential to the 21st-century classroom, making it one of the most highly ranked technologies among all four groups. Connectivity to that network from home is also perceived as essential for all participant groups. Professional staff ranked a desktop computer as essential while only 49.5% of students agreed. Digital content and course management systems ranked high with faculty and students reflecting a degree of commonality among four of the top five essential tools for these two groups. One noticeable gap was found in the use of smartphones (BlackBerry, Droid, or iPhone) as an essential technology, as administrators were the only group including this in their top five essential tools. The other gap was reflected in the perception by IT staff of the importance of recorded class lectures; they ranked this higher than students, faculty, and administrators. Noticeably, only 18% of the faculty ranked recorded class lectures as essential, compared to 41.4% of the students.

The types of technology used in teaching have been the subject of the scholarly literature for some time. Groves and Zemel (2000) were interested in understanding how university faculty were adopting instructional technologies in their teaching. In their review of the types of technologies most favored by faculty, they found that technologies

such as word processing, internet use, and presentation software were used frequently and technologies such as multimedia, computer assisted instruction, and distance learning were used less frequently. More recently, one of the largest studies of faculty work-life issues provides a more current assessment on technology use (DeAngelo et al., 2009). The HERI Faculty Survey of 2007-2008 of 22,562 full-time faculty found faculty are increasing their use of email and are using the internet to post course assignments or teach online. The findings, seemingly not much different than the Grove and Zemel study of 2000, reflect an increase in the learning of technical skills yet fail to reflect how technologies are used to support a student-centered educational experience.

Disagreement about what belongs in a 21st-century classroom was the subject of the report by CDW-G that highlighted the perceptions of more than 1,000 students, faculty, and IT staff on what belongs in today's classroom (CDW-G, 2010a). As was found in this study, gaps were found between IT staff and faculty with regard to recorded class lectures. The results of CDW-G survey indicated that more than three-fourths of faculty say it is important they teach in a 21st-century classroom, but when it comes to essential technology for the classroom, IT staff have an expanded view of what is possible. For example, nearly 6 in 10 IT staff supported lecture capture, according to the survey, but only 2 in 10 instructors were in agreement. As was previously mentioned in Chapter 2, slow adoption of technology by faculty rests primarily on the notion of preserving the traditional classroom. As colleges seek to remain competitive and sustainable in an ever-increasing global market that has been markedly influenced by technology, how they respond to the changing demands of students and the tools they

require for educational purposes will influence college choice for many undergraduates in the future.

Perception 4 – Technology as a learning tool (S11). When students were asked if their college understood how they used or wanted to use technology, 64.5% of the respondents agreed or strongly agreed, while staff similarly agreed at slightly higher rates. Staff also disagreed or strongly disagreed at significantly higher rates than students, reflecting a difference of perception between students and staff. A slightly higher number of respondents overall reported agreement or strong agreement that their college values technology as a learning/teaching tool (72.9%), but much fewer agreed their college is preparing students to successfully use technology as a business or professional tool when they enter the workforce (59%). Most notably, however, agreement on the perceptions about the value of learning technology skills to improve students' educational and career opportunities in the future was overwhelming, agreed to by 91.4% of all respondents, and supported by staff who also support the importance of technology as a critical component to students' success in college and the workforce.

These findings appear to be more positive than the results reported by other internet survey research conducted by the Educause Center for Applied Research (Smith, Salway, & Caruso, 2009). In their study of 30,616 undergraduate college students, when asked if the use of technology in courses improves their learning, about half (49.4%) agreed. Another 39% of the respondents were neutral about the use of technology in classes improving their learning, and 11.5% of the students actually disagreed with this statement. About half the respondents (46.8%) agreed that upon graduation the technology used in their courses will have adequately prepared them for the workplace.

The Smith et al. study, however, was mostly comprised of four-year institution students, as only 8.2% (n=2,522) of the sample was from 12 associate degree granting institutions. Therefore, the responses are biased toward freshman and seniors at these institutions and may not be indicative of the perceptions of community college students. The importance of technology is also reflected in the survey by Project Tomorrow (2010). Through a project for the K-12 system, the results showed 90% of district administrators reported the implementation of technology was important/extremely important to their mission. Finally, in a national executive survey of 289 executives from higher education and corporate settings, 56% of the respondents indicated their country's university and college students were able to compete in a global marketplace with regard to their technology skills (Glenn, 2008). Only 19% rated their students well prepared, fueling a sense of urgency to equip students with an adequate education in their field of study as well as to also arm them with the skills and knowledge required to leverage technology effectively in the workplace. These surveys, like the result of this study, underscore the importance of technology to the future success of today's college student and reflect an understanding of the context for valuing technology and its role in increasing student success in college and in the workplace.

Utilization. As college administrators seek new ways to be responsive to their changing students' needs, many look to initiatives and solutions resting on emerging technologies in the classroom and for communication. However, today's students do not necessarily see themselves learning out of large lecture halls. With access to the internet and a range of other technologies, students prefer more informal learning environments and small-group discussions, much of which can be done remotely (Flynn, 2008). As

these digital experiences begin to displace traditional classroom settings, how these new tools are embraced by colleges will impact student learning both on and off campus. The degree to which there is a gap between the gadgets owned and used by faculty and students will be of particular import. This section addresses these differences. The findings of this study are supported by other surveys on the topic of information technology and the devices used (Baldassare, Bonner, Petek, & Shreshta, 2010; Smith et al., 2009).

ECAR survey respondents continue to own a wide variety of information and communication technologies and use them regularly to communicate, find, and exchange information on the internet, do classwork, and recreate (Smith et al., 2009). The survey found that today's students overwhelmingly prefer laptop computers to desktop computers, and growing numbers of students own smart handheld devices. Very little scholarly literature exists on how the tools owned and used by students compares to those used by faculty or other college staff. One statewide survey, however, does seek to inform the important public policy issues around the changing nature of connectedness and differences between Californians who are and are not connected (Baldassare et al., 2010). The PPIC Statewide Survey of 2011 finds Californians are twice as likely to use their cell phone to access the internet than just three years prior, with nearly all Californians (93%) having cell phones, and 39% saying they have a smartphone. Most residents they find have a desktop computer (65%) or laptop or netbook (61%), fewer have a game console (41%) or an electronic book reader (11%). The findings suggest ownership of other electronic devices that connect to the internet varies across

demographic groups. Of particularly import is the finding that Latinos are the least likely to have a broadband connection than blacks, Asians, and whites.

Item 1 – Tools used/owned (S5). The technologies survey participants own vary quite a bit. While broadband use is high for all groups, more administrators (89.3%) have smartphones than faculty (60.3%), IT staff (65.5%), and students (54.4%). Professional staff own more desktop computers than students, but students also own fewer laptops than the professional staff. None of the survey participants appeared to be heavy users of e-books or tablets. With the exception of game consoles and iPods, students owned fewer gadgets than professional staff. As faculty continue to engage students in learning by choosing and implementing appropriate technologies for enhancing student learning, improving communication, and fostering engagement, whether students have the tools to access these new methodologies will have a potential effect on student success.

Item 2 – Phone devices (S6). Smartphones are comprised of a variety of types including, Blackberry, Android, iPhone, and Windows Mobile. Though the lines are blurring, feature phones differ from smartphones in that they tend to be lower-end devices without the added features of a smartphone and tend to cost about half the price. Sixty-one percent of mobile phone users are using smartphones, according to the survey results. iPhone is the most popular operating system with 27.8% of participants reporting they have a smartphone with an iPhone operating system. Android is second place, with 27.4%. The overall findings do not reflect student use, however, in that the number one phone for them is the Android (31.2%) followed by a feature phone (27.4%) and iPhone (19.4%). The student data more closely aligns with smartphone usage trends reported by Neilsen (Kellog, 2011). According to July 2011 data from Neilsen, Android (40%) use

exceeds iPhone use (28%) by 12%. With the cost of feature phones being significantly less than smartphones, it is not surprising community college students use features more than the iPhone. This finding is supported by data in the PPIC Statewide Survey indicating the share of Californians with a smartphone rises sharply with household income (29% under $40,000, 42% at $40,000-$80,000, 57% at $80,000 or more) (Baldassare et al., 2011).

Item 3 – Texting plans (S7). Over three-fourths of students indicated they had an unlimited text message plan (76.3.3%) compared to administrators (67.9%), faculty (49.2%), and IT staff (37.9%). This finding is relevant as colleges consider alternative or more responsive ways to communicate with students and college staff. Improving upon the educational experience is a challenge for most community colleges, and the issues surrounding student engagement and its effect on student success is well noted. Critics of technology adoption emphasize high-touch over high-tech all the while colleges struggle to get timely and pertinent information into the hands of their students. This finding allays the concern that large number of students would resist information by text because of the cost associated with receiving them, as only 3.8% of students indicated they paid for each text message. The same holds true for administrators (3.6%), faculty (8%), and IT staff (17.2%). The use of texting to increase student engagement was the subject of an article in School Library Monthly (Tilley, 2009). Tilley (2009) asserted cell phones, and by extension, texting, have the potential to be used as tools for ubiquitous learning that would allow for enhanced collaboration and communication (p. 41).

Item 4 – Email use (S8). While nearly 67% of all respondents indicated they had several email accounts, more staff had several email accounts than students and tended to

keep college email separate from other email. They also tended to forward their college email to another address at lower rates than students. While little research exists on the use of email between faculty and students, one such study did reveal faculty motives for initiating e-mail appear to be utilitarian in nature such as to make course announcements. Duran, Kelley, and Keaten (2005) reported that according to faculty, students used e-mail to make appointments and clarify and ask questions about course material but a primary motive was to offer excuses such as for late work. The findings suggest faculty perceive the use of e-mail as both beneficial and a liability in the educational context. How email is used is relevant because of its use as a mass communication tool. Studies indicate that while faculty support the use of email as a means of communication, they are not accustomed to sending course materials, syllabi, project instructions, and lecture notes to students personally via email (Yates, Adams, & Brunner, 2009). This nationwide study was based on nearly 700 teaching faculty and encourages faculty to embrace the technology and develop positive ways to incorporate email, as well as other technology, into the educational process.

Research Question Two

Question 2: In terms of technology perceptions/expectations and utilization, are there significant generational differences within and between various community college professionals and students?

The focus of the literature review in Chapter 2 on generational theory examined the differences between researchers and how the generations are defined by age, certain attitudes, and beliefs (Elder, 1994; Gordon & Steele, 2005; Lifecourse.com, 2010; Reeves & Oh, 2007; Strauss & Howe, 1991, 2000). Gordon and Steele (2005), echoing Strauss and Howe (1991), in their study of the generational differences and challenges in

academic advising settings, suggest differences in perceptions of work attitudes and values, management expectations, communication patterns, and even work hours and dress are influenced by the historical, cultural, economic, and social events of their time. The differences between the generations are the subject of much scholarly research as well, particularly in the area of instructional design and workplace differences (Arsenault, 2004; Dychtwald et al., 2007; Erickson, 2008; Reeves, 2006; Zickuhr, 2010). Arsenault (2004) concluded, in his study of how a generation views leadership, the "results validate the importance of generational differences as a legitimate diversity issue" (p. 137). While it is not presumed everyone in the same generational group shares the majority's views, the topic of generational differences serves as a framework from which to foster relevant and productive discussions about the evolving needs of college students and changes in the workplace (Smith, 2008).

Perceptions/Expectations. The four survey items reflecting the perceptions and expectations of the respondents are discussed.

Perception 1 – College and workplace choice (S2). Baby Boomers were less affected by the level of technology in terms of college choice or workplace selection, as 26.5% indicated technology was not important to this decision, compared to 14.6% of Gen X and 18.9% of Millennials. Conversely, Gen X and Millennials indicated technology is important or very important at higher rates than Boomers. But whether or not a college's technology offerings are as important to Boomers as they would be to the other generations might be more reflective of their place in the workforce than how they rate technology. According to Gordon and Steele (2005), Boomers hold some of the high-level faculty and administrative position on campuses and tend to have the most

experience and responsibility. As such, they are likely to move into even higher levels of authority as more and more Traditionalists retire irrespective of what technology is present in those opportunities.

Perception 2 – Rating campus technology (S3). Item 3 on the Student Survey revealed some believed the technology at their campus was cutting edge (11.7%, n= 51). Additionally, most rated their college as adequate or as having technology that is no more than three years old: Baby Boomers (83.2%, n= 128), Gen X (79.25%, n= 129), and Millennials (81.28%, n=86). With no more than a 3% difference, this perception seemed to be fairly consistent among all three generations, similar to the findings found among the four participant groups of students, faculty, administrators, and IT staff.

Perception 3 – Essential technologies for the 21st century classroom (S4). While there truly is no set definition for what a 21st-century classroom contains, many would suggest a successful 21st-century campus would allow for a greater role of emerging technologies in a student-centered institution unconstrained by time and place through, for example, mobile learning, online learning, and digital content (Project Tomorrow, 2011; Segall & Freedman, 2007; Van der Werf & Sabatier, 2009). Tools considered essential to this environment vary by generational cohort: Baby Boomers (video/web conferencing, desktop computer, access to the network from home, wireless network/internet, course management system), Gen X (media tablet, blogs/wikis, multimedia content streaming, podcasts/vodcasts, e-reader device), and Millennials (iPod/MP3 player, social networking sites, e-reader device, blogs/wikis, recorded class lectures). The tools rated highly by Baby Boomers tended to be those already in most classrooms, while Gen X and Millennials emphasized tools not as common and would

encourage new approaches to learning using digital resources and forums for dialogue outside a traditional classroom. This finding is also supported in the literature as was found in a relatively recent study of faculty perceptions toward the implementation of digital technologies (Salajan, Schöwetter, & Cleghorn, 2010). Salajan et al. (2010) found the existence of a slight inter-generational difference in the perceived usefulness and importance of digital technologies for teaching and learning. As some suggest the Baby Boom generation is the most technically challenged (Tolbize, 2008), this may be reflective of their lack of enthusiasm to rate new emerging technologies very highly. As colleges begin to address the changing learning needs presented by our younger generations, Baby Boomers will need to be open to providing a high quality education that perhaps looks very different than the classroom of print literature and face-to-face communication.

Perception 4 – Technology as a learning tool (S11). Perhaps because technology has increasingly been identified as an emerging trend and major challenge to higher education institutions (Flynn & Vredevoogd, 2010; Grummon, 2010), the results do not reflect much disagreement about the role of technology in a learning college. A greater number of respondents either agreed or strongly agreed the college understands how students use or want to use technology and their college values technology as a learning tool. However, on both of these items, Gen X also disagreed more than the other two cohorts. The generations share similar views on the colleges preparing students to successfully use technology as a business and professional tool when students enter the workforce and most all agreed learning and mastering technology skills will improve educational and career opportunities for students in the future. Millennials appear

neutral, however, about the link between technology and student success. This perhaps is indicative of the Millennials growing up in the ubiquitous environment of technology and their interaction with it and the skills they have developed to use it are as important to them as food and clothing. Their expectations regarding how they learn hard and soft skills, interestingly enough, are through peer interaction and feedback, discussion groups, and one-on-one coaching. It is not how these interactions are conducted, but rather the content of them, which for them is collaborative in nature, team driven and peer-based (Howe & Nadler, 2012; Tolbize, 2008).

Utilization. Millennials and Gen X want cutting-edge technology, and they are likely to have it everywhere they go (Howe & Nadler, 2012). Understanding the extent to which the adult population has increased their reliance on information and communication technology is the subject of the Pew Internet Project & American Life Project (Horrigan, 2009). The survey reflects many of the findings found herein: ownership and use are up for cell phones, broadband internet access at home, laptops, and Ipods or MP3s. As mobile internet access is drawing people into more frequent online use and deeper into the digital world, it is worth exploring whether there are differences among the generations in terms of the tools they use.

Item 1 – Tools used/owned. Item 5 on the Student Survey revealed all three groups were heavy users of broadband internet access at home. High-speed internet connectivity is seen as utility by most Californians as well (Baldassare et al., 2011), with 92% of 18 to 34-year-olds reporting they access the internet at least occasionally and 84% of that age group reporting they have internet connection at home. Similarly, 84% of those aged 35-54 access the internet at least occasionally, and 77% have internet

connection at home. Baby Boomers are more likely to use a desktop computer than Gen X and Millennials, which is also reflected in the LexisNexis workplace survey (WorldOne Research, n.d.). They found 36% of Boomers use a desktop computer, compared to 24% of Gen X, and 14% of Gen Y (referred to as Millennials in this study). Fewer Millennials owned iPods than Baby Boomers and Gen X. All groups ranked ownership or use of tablets, e-books, and game consoles the least. Overall, Millennials owned fewer of these devices than Baby Boomers and Generation X. These findings are supported by the Pew Research Center, reporting that while "some devices grow ubiquitous in American life, others remain the domain of the young. But Millennials are not always more likely to own certain gadgets" (Pew Research Center, 2011, p. 2). In that study, more Millennials owned cell phones (95%), laptops (70%), iPods/mp3 players (74%), and game consoles (63%) than Gen X and Baby Boomers, and Gen X owned more of these than Boomers. Similarly, all groups owned fewer e-books and iPad/tablets than the other devices, between 4 and 7% for all generations.

Item 2 – Phone devices. While the cell phone devices by each of the generations vary, iPhones and Androids top the list, followed by feature phones most used by Baby Boomers. Mobile access to internet provided by these phones enable users to stay connected and engage in a continual information exchange and has been deemed as an inflection point in technology adoption (Horrigan, 2009). These findings are supported by the Pew Research Center (Zickuhr, 2010). They indicate, "about six in ten Americans (59%) go online wirelessly, either through their smartphones or through a wireless card on their laptop" (p. 8). Boomers, they found as well, go online wirelessly at lower rates (55%) compared to Millennials (82%) and Gen X (71%).

Item 3 – Texting plans. With Millennials and Gen X going online through their phones, they are also sending instant messages at higher rates than Baby Boomers; as such, it not surprising that three-fourths of Millennials indicated they have an unlimited text message plan (78.3%, n= 83) compared to Baby Boomers (46.5%, n= 73) and Gen X (66.1%, n= 109). Boomers (21%, n= 33) indicated they do not text message at higher rates than Gen X (9.1%, n= 15) and Millennials (12.3%, n= 13). This finding is also reflected in the Pew study reporting between 30 and 35% of Boomers go online to send instant messages at significantly lower rates than the younger generations (Millennials, 66% and Gen X, 52%).

Item 4 – Email use. A growing number of online activities are becoming increasingly common across generations, though differences are still present between the youngest and oldest cohorts (Zickuhr, 2010). One of these differences, however, is not in email use, according to Zickuhr (2010). Little variation exists between Boomers (91-93%), Gen X (94%), and Millennials (96%) in terms of going online to use email in the Pew study. In terms of how email is used, this study revealed differences with regard to who had several email accounts, whether they kept college email separate from other email, and forwarding college email to another email account.

Conclusion

Few will argue the topic of generations in the workforce, including institutions of higher education, such as the site under investigation in this study, is a topic of interest in scholarly literature and popular press as cited in Chapter 2 herein. Large-scale surveys conducted by corporate and educational research organizations have decisively determined there really is a generational divide causing problems in the workplace (Howe

& Nadler, 2012). Further, despite the absence of reliable and valid data in this arena, as well as any agreement on the definitions of each generation, such as Baby Boomers, Gen X, and Millennials, academic studies do yield findings substantiating these generational differences. Many of the findings in this study reflect similar research conducted on generational differences and specifically on how generational differences among faculty, staff, and students in community colleges may influence the acceptance of information and communication technologies. By using the nomenclature of generation theorists (Strauss & Howe, 2000; Oblinger & Oblinger, 2005; Zemke, 2000), comparisons can be drawn that shed light on how these differences may influence the adoption of emerging technologies that serve to guide community college students in their educational process. This is of particular interest to college and university educators who struggle to meet the demands for innovation placed upon their institutions by young college students who have grown up in the digital world and cultivate a work environment supporting and including the adoption of emerging technological advances.

As the results of this study are not surprisingly different from similar research, the conclusions drawn herein are made within the context of the community college system. Such a system is comprised of a number of stakeholder groups, each of which present different perceptions and attributes in terms of their acceptance of new information technologies. The following conclusions highlight the similarities and differences found in this study. In addition to the four stakeholder groups and their differing perceptions and interests, generational differences is the primary variable of interest in this study (see Table 26).

Table 26

Similarities and Differences in Perceptions and Tool Usage Between Generations

Perceptions & Tools	Age		
	Baby Boomer	Gen X	Millennial
S 2 College/ Workplace choice DIFFERENT	Not Important (27%) Somewhat (16%) Important (32%) Very (27%)	Not Important (15%) Somewhat (13%) Important (35%) Very (37%)	Not Important (19% Somewhat (22%) Important (25%) Very (35%)
S 3 Campus technology SIMILAR	Dark Ages (6%) Adequate (44%) Current (39%) Cutting edge (11%)	Dark Ages (10%) Adequate (31%) Current (48%) Cutting edge (11%)	Dark Ages (8%) Adequate (27%) Current (54%) Cutting edge (11%)
S 4 Top 5 essential technologies to a 21st century classroom DIFFERENT	1. Video/web conferencing (43%) 2. Desktop computer (42%) 3. Access internet from home (39%) 4. Wireless network (37%) 5. Course management system (36%)	1. Media tablet (45%) 2. Blogs/wikis (45%) 3. Multimedia content streaming (44%) 4. Podcasts/vodcasts (43%) 5. e-reader (42%)	1. iPod/MP3 (44%) 1. Social networking sites (41%) 3. e-reader (34%) 4. Blogs/wikis (34%) 5. Recorded class lecture (32%)
S11			
College understands student use	Disagree (10%) Neutral (21%) Agree (69%)	Disagree (14%) Neutral (19%) Agree (67%)	Disagree (7%) Neutral (29%) Agree (64%)
College values	Disagree (6%) Neutral (18%) Agree (76%)	Disagree (10%) Neutral (18%) Agree (72%)	Disagree (7%) Neutral (25%) Agree (69%)
Prepare students to use	Disagree (11%) Neutral (25%) Agree (64%)	Disagree (13%) Neutral (31%) Agree (56%)	Disagree (14%) Neutral (28%) Agree (58%)
Improves student success	Disagree (2%) Neutral (6%) Agree (92%)	Disagree (1%) Neutral (6%) (Agree 93%)	Disagree (1 %) Neutral (10%) (Agree 89%)
Critical to student success	Disagree (0%) Neutral (21%) Agree (79%)	Disagree (1%) Neutral (39%) Agree (61%)	Disagree (0%) Neutral (94%) Agree (6%)

Table 26 (continued)

Perceptions & Tools	Age		
	Baby Boomer	Gen X	Millennial
S 5 Tools owned/used DIFFERENT	Broadband internet (95%)	Broadband internet (90%)	Broadband internet (76%)
	Desktop computer (87%)	Laptop/Netbook (81%)	Laptop/Netbook (72%)
	Laptop/Netbook (73%)	Desktop computer (80%)	iPod/MP3 (68%)
	Smartphone (59%)	Smartphone (67%)	Desktop computer (62%)
	IPod/MP3 (54%)	iPod/MP3 (59%)	Smartphone (56%)
	Tablet computer (27%)	Game console (44%)	Game console (51%)
	e-book (25%)	Tablet computer (31%)	Tablet computer (16%)
	Game console (23%)	e-book (26%)	e-book (17%)
S6 Phone devices DIFFERENT	Feature (33%)	iPhone (33%)	Android (36%)
	iPhone (32%)	Android (26%)	Feature (26%)
	Android (24%)	Feature (26%)	iPhone (17%)
	Blackberry (4%)	Blackberry (5%)	Don't use (4%)
	Don't use (3%)	Windows Mobile (2%)	Windows Mobile (4%)
	Windows Mobile (2%)	Don't use (2%)	Blackberry (2%)
S7 Texting plans SIMILAR	Unlimited (47%)	Unlimited (66%)	Unlimited (78%)
	Mid-sized (24%)	Mid-sized (16%)	Don't text (12%)
	Don't text (21%)	Don't text (9%)	Mid-sized (7%)
	Pay per message (8%)	Pay per message (9%)	Pay per message (2%)
S8 Email use DIFFERENT	Don't use (0%)	Don't use (0%)	Don't use (0%)
	Use little as possible (6%)	Use little as possible (2%)	Use little as possible (4%)
	Have several accounts (72%)	Have several accounts (72%)	Have several accounts (52%)
	Keep college separate (75%)	Keep college separate (60%)	Keep college separate (35%)
	Forward college email (14%)	Forward college email (29%)	Forward college email (62%)
	Would use Gmail (22%)	Would use Gmail (32%)	Would use Gmail (27%)

Community colleges reflect a diverse demographic representing differences in terms of age, ethnicity, and gender among faculty, staff, administrators, and students. The research questions were based on a presumption that such rich diversity would manifest itself in differences across participant groups and by age. The research

concludes that with regard to perceptions and expectations held by community college professionals and students, some differences are present.

Perceptions

It was found that the perceptions of the presence of campus technology differ across the four previously mentioned groups but the presence of campus technology matters most to IT professionals and Gen X. Despite these differences, there does not appear to be a gap in terms of expectations. The majority of respondents agreed the technology on their campus was adequate or at least not older than three years, reflecting the perception that the district in this study is in fact keeping pace with technology demands. While what constitutes a 21st-century classroom varies across the four participant groups, all agree wireless access to the internet is the number one essential tool. This did not hold true among the three generational cohorts, however, as what were considered essential tools in the classroom varied by age. Finally, with regard to perceptions, most survey participants value the important role technology has on student success though there is some disagreement between the participant groups as to whether their college understands how students use or want to use that technology; these perceptions also differed by age.

Utilization

In term of utilization, the technological tools owned or used varied by the four participant groups and by age. For example, more professional staff than students have smartphones, laptops, e-books, and desktop computers. Students have more iPods or MP3 players than staff. These differences were also found across the generational

cohorts. How each participant group manages their college email also varies by group and age.

The research concludes that professional staff value and use technology in ways different from students. These differences were also observed in no particular pattern across the generational cohorts. The lack of consistency in the overall tendency of responses from individuals suggests other potential focuses for generational as well as technology adoption research in community colleges. Additionally, given the limitation to access a greater number of students, future research should attempt to obtain a representative sample by cohort segmentation so the results may be generalizable to community college professional staff or students and significant conclusions can be drawn. Finally, similar to the survey instrument that exists in the corporate setting to investigate whether or not there is a gap between generations in terms of technology in the workplace, further research can explore the development of a psychometrically sound instrument for community college professionals and students. The instrument would determine if attitudes and perceptions toward the use of technology vary based on age.

Recommended Actionable Solution

Understanding the differences in perceptions and utilization of technology among the three generations in the community college workplace is of practical use to the organization in this study. A more complete understanding of these differences between and among members of the generational cohorts and between staff and students can inform the work of college faculty and leaders who strive to stay competitive under the pressures for innovation and technology adoption by students and Millennial employees. This can be achieved in several ways. First, students need to be invited to sit at the table

and to be involved in the decision making processes of the college that focus on learning and classroom technology integration. Second, absent formal structures such as governance committees and work groups that can provide for direct involvement by students, engaging students through focus groups or survey research can capture important information on the tools that students use and their expectations for personalizing their teaching and learning. Third, let students model the way by allowing them to use their digital gadgets to learn at their own pace, on their own schedule, both in and outside of the classroom. Understanding the differences in perceptions toward and use of the different technological tools is of prime importance to charting a future fostering relevant and significant systemic change in a higher education organization. Attending to these differences and inputs will allow leaders to continue their work creating a flexible and responsive workplace for employees and a destination college for the growing number of students who have never known life without technology. It is within this context the following recommendations are made.

Baby Boomers (ages 50+)

As technology becomes as important to people as food and clothing, it will become increasingly important for decision makers and policymakers to provide adequate support and training to those who lean toward to the laggard side of the innovativeness continuum. While many Baby Boomers continue to rely on traditional values and means of communication, those remaining in the workplace recognize the importance of technology and their need to move toward adoption of new useful technology. In undertaking this shift, they are observing the behaviors of others in the system as they weigh skepticism of new ideas within the existing resource limitations. Professional

development activities can encourage these collaborations by establishing training programs that rely on the use of Millennial and Gen X training partners. As the Boomers move toward the other end of the adoption scale, older members of the organization find themselves engaged in more social participation with these younger members of the organization, transitioning from time-tested strategies of the past to the new paradigms of the future. The proactive pairing of members from these generational cohorts may also serve as informal means for Boomers to better understand the interests of their younger colleagues and the students they serve. Formal mechanisms for sharing the perceptions and experiences of others in the organization can be captured through regularly scheduled surveys intended to gather such data. As previously mentioned, as Boomer leaders set the priorities, allocate resources, and make decisions regarding technology development and implementation, proactive pairings and data sharing provide decision makers with a better understanding of how technology can be used to leverage student success and institutional effectiveness and make the systemic changes needed to stay competitive in the 21st century.

Generation X (ages 30-49)

While members of the Gen X cohort are not wholly unfamiliar with technology, they are not out front in terms of technology use. Representing the largest percentage of the workforce, they serve a key role in building and maintaining an effective workplace by acting as a much needed bridge in communication between the Boomers and Millennials (Smith, 2008, p. 8). Members of Gen X, like their Millennial colleagues, want cutting-edge technology in the workplace. Boomer colleagues may perceive their Gen X colleagues as impatient and willing to throw out time-tested strategies for no good

reason, but Gen X and their more flexible attitudes toward change are likely to embrace early adopters and be one in their own right. These are the members of the organization to whom Boomers will turn before adopting a new idea themselves. Bringing these early adopters into the decision making process puts them in a position to serve as role models for other members of the social system (Rogers, 2003). It also provides the needed support to boost interest and garner approval on new ideas that boost efficiency and move the organization forward. As more Gen X professionals fill the vacancies left by their Boomer colleagues, they may bring these strengths and values to their leadership roles which can potentially, and hopefully, change the pace of innovation and technology adoption in community colleges. These changes will likely be reflected in newly developed organizational structures that may differ than those currently in place and place an emphasis on integrating technology into the organizational strategies and priorities of the institution. As faculty members and other members of the workforce grow in their adoption of new technologies, for example, college leaders can best meet these emerging demands by engaging these early adopters in the planning process to chart a course for long-term technology needs of the future.

Millennials (ages 18-29)

As the generation most comfortable with technology and characterized by their ability to multi-task, collaborate, and possess a more integrated view of the organizational hierarchy (Murray, 2011), Millennial employees and students, those born between 1983 and 1994, will be most venturesome in approaching new ideas in the community college setting. Being the youngest members of a governance system as complex as that which exists in the community college system, their ability to effectively judge the quality of

information and their views on new approaches to teaching and learning are often questioned by their senior colleagues. But as students in the educational pipeline envision education vastly different than their parents, teachers, and administrators, their input into the social system holds great promise in terms of reenvisioning the method and content of a community college education. Providing opportunities for Millennials to participate in strategic planning discussions and decisions and help shape the dialogue and fundamental thinking about teaching and learning can shed light on how individual differences and shared attributes across the generational cohorts can encourage acceptance of innovation throughout the organization. One of the ways such input can be harnessed is to use the technology that Millennials themselves use in their daily lives. With a preference for working in a virtual environment, the internet and social media websites provide new opportunities to better understand the perspectives of the Net Generation prior to making investments in IT or other parts of a student-centered organization. Through these virtual collaborations, the institution engages students and Millennial employees in a dialogue within which they may not have previously participated thereby providing a better understanding of this new environment. This new knowledge can help leaders anticipate the complex, fast moving, and on-going changes that require them to make decisions that optimize their organization's goals and strategic directions.

Summary

This quantitative study used survey research methodology to gather and analyze data from 442 students, administrators, faculty, and information technology staff at four community colleges within one district in Northern California. A literature review was

conducted to define the major elements of the study and to create a set of research questions to be studied. The *CDW-G 21st Century Campus Assessment Tool* was used as the foundation for this study and it was modified to reflect the culture of the organization under investigation. The web-based survey was sent out via an email invitation to 1,572 students, 2,384 full- and part-time faculty, 116 administrators, and 99 information technology staff to gather the perceptions, expectations, and utilization of technology. The response rates for each group were: students (11.83%, n= 186), faculty (8.34%, n= 199), administrators (24.13%, n=28), and information technology staff (29.29%, n= 29). Thirty-five percent of the respondents were members of the Baby Boomer generation, 37% were Gen X, and 24% were Millennials. The conclusions drawn encourage a focus on professional development for Baby Boomers, allowing for the cross-fertilization of input from Millennials and Gen X and consideration of succession planning in terms of how inputs to an organization will change as younger generations take on positions of leadership, engage in strategic planning, and make decisions. Uncovering the differences in the way each generation perceives and uses technology and applying this knowledge to the evolving mission of the community colleges will make what seems insurmountable in a climate of dwindling resources and fractured support for our work purposeful and achievable. By leveraging the leadership potential of members across all generational cohorts, community college leaders create a unique and engaging learning environment that has relevance for its employees and the students they serve. The results herein are to be considered instructive rather than conclusive for those surveyed.

List of References

Academic Senate for California Community Colleges (ASCCC). (1997). *Guidelines for good practice: Technology mediated instruction*. Sacramento, CA: Author.

Academic Senate for California Community Colleges (ASCCC). (2000a). *Guidelines on minimum standards for college technology*. Sacramento, CA: Author.

Academic Senate for California Community Colleges (ASCCC). (2000b). *Technology in education: A summary of practical policy and workload language*. Sacramento, CA: Author.

Academic Senate for California Community Colleges (ASCCC). (2002). *Technology in education: A collection of academic senate papers on technology.* Sacramento, CA: Author.

Academic Senate for California Community Colleges (ASCCC). (2008). *Ensuring the appropriate use of educational technology: An update for local academic senates*. Sacramento, CA: Author.

Agarwal, R. (1997). The role of innovation characteristics and perceived voluntariness in the acceptance of information technologies. *Decision Sciences, 28*, 557-582.

Agarwal, R. (1999). Are individual differences germane to the acceptance of new information technologies? *Decision Sciences, 30*, 361-391.

Agarwal, R., & Prasad, J. (1998). A conceptual and operational definition of personal innovativeness in the domain of information technology. *Information Systems Research, 9*, 204-215.

Altbach, P., Berdahl, R., & Gumport, P. (Eds.). (2005). *American higher education in the twenty-first century: Social, political and economic changes*. Baltimore, MD: John Hopkins University Press.

Arsenault, P. (2004). Validating generational differences, a legitimate diversity and leadership issue. *The Leadership & Organization Development Journal*, *25*(2), 124-141.

Baldassare, M., Bonner, D., Petek, S., & Shreshta, J. (2011). *Californians & information technology*. San Francisco: Public Policy Institute of California.

Banathy, B. (1999). Systems thinking in higher education: Learning comes to focus. *Systems Research and Behavioral Science, 16*, 133-145.

Beverage, M. (2003, September/October). Slow change in a fast culture. *Educause Review Magazine, 38*(5), 10-11.

CDW Government. (2008). *The 21st century campus: Are we there yet? Challenges and opportunities for campus technology*. Retrieved from http://newsroom.cdwg.com/features/feature-10-13-08.html

CDW-Government. (2010a). *The 21st century campus report: Campus 2.0*. Retrieved from http://newsroom.cdwg.com/features/feature-06-28-10.html

CDW-Government. (2010b). *The 21st century classroom report: Preparing students for the future or the past?* Retrieved from http://newsroom.cdwg.com/features/feature-07-19-10.html

Church, H., & Waclawski, J. (1998). *Designing and using organizational surveys*. Aldershot, England: Gower.

Conger, G. P. (1922). *Theories of macrocosms and microcosms in the history of philosophy*. New York: Columbia University Press.

Cook, C., Heath F., & Thompson, R. (2000). A meta-analysis of response rates in web-or internet-based surveys. *Educational & Psychological Measurement, 60*, 821-837.

Couper, M. P. (2000). Web surveys: A review of issues and approaches. *Public Opinion Quarterly, 64*, 464-485.

Creswell, J. (2008). *Educational research. Planning, conducting, and evaluating quantitative and qualitative research*. Columbus, OH: Pearson Education, Inc.

Davidson, C., & Goldberg, D. (2010). *The future of thinking: learning institutions in a digital age*. Cambridge, MA: MIT Press.

DeAngelo, L., Hurtado, S. H., Pryor, J. H., Kelly, K. R., Santos, J. L., & Korn, W. S. (2009, March). *The American college teacher: National norms for the 2007-2008 HERI faculty survey*. Los Angeles: Higher Education Research Institute, UCLA.

Demuth, L. (2010, April). Accepting technology as a solution: *A quantitative study investigating the adoption of technology at colleges* (Unpublished doctoral dissertation). Capella University, Minneapolis, MN.

Drack, M. (2009, July). Ludwig von Bertalanffy's early system approach. *Systems Research and Behavioral Science, 26*, 563-572.

Duran, R., Kelley, L., & Keaten, J. (May 2005). College faculty use and perceptions of electronic mail to communicate with students. *Communication Quarterly, 53*, 159-176.

Dychtwald, K., Erickson, T., & Morison, R. (2007). *Workforce crisis: How to beat the coming shortage of skills and talent*. Boston, MA: Harvard Business School Publishing Corporation.

Economist Intelligence Unit. (2008). The future of higher education: How technology will shape learning. *The Economist*.

Educause. (2005). *Educating the net generation*. Retrieved from http://www.educause.edu/educatingthenetgen/

Elder, G. (1994). Time, human agency, and social change: Perspectives on the life course. *Social Psychology Quarterly, 57*(1), 4-15.

Erickson, T. (2008). *Plugged in: The generation Y guide to thriving at work*. Boston, MA: Harvard Business School Publishing Corporation.

Falletta, S. V. (2008). Organizational intelligence surveys. *Training & Development Magazine, June*, 52-58. Alexandria, VA: American Society for Training and Development.

Flynn, W. (2008). Built to last. *Community College Journal, 79*(2), 22-26.

Flynn, W., & Vredevoogd, J. (2010). The future of learning: 12 views on emerging trends in higher education. *Society for College and University Planning, 7*(1), 5-10.

Fowler, F. (2009). *Survey research methods*. Thousand Oaks, CA: Sage Publications, Inc.

Giancola, F. (2006). The generation gap: more myth than reality. *People and Strategy, 29*(4), 32-37.

Glenn, M. (2008). The future of higher education: How technology will shape learning. New York: *The Economist*.

Gordon, V., & Steele, M. (2005, Spring). The advising workplace: Generational differences and challenges. *NACADA Journal, 25*(1), 26-30.

Green, K. (2010, October). *The campus computing project. IT budget cuts are down; LMS strategies are in transition*. Retrieved from http://www.campuscomputing.net/sites/www.campuscomputing.net/files/Green-CC2010-ExecSummaryGraphics.pdf

Groves, M., & Zemel, P. (2000). Instructional technology adoption in higher education: An action research case study. *International Journal of Instructional Media, 27*(1), 57-65.

Grummon, P. (2010). Trends in higher education. *Society for College and University Planning, 7*(1), 51-60.

Hannay, M., & Fretwell, C. (2011). The higher education workplace: Meeting the needs of multiple generations. *Research in Higher Education Journal, 10*, 1-12.

Hesser, M. (2008, January). A comparison of phone and online research: Each has its strengths and weaknesses. *Quirk's Marketing Research Review*, 26.

Horrigan, J. (2009). *The mobile difference*. Washington, DC: Pew Research Center.

Howe, N., & Nadler, R. (2012). *Why generations matter: Ten findings from lifecourse research on the workforce*. Great Falls, VA: Lifecourse Associates.

Ison, R. (1999). Applying systems thinking to higher education. *Systems Research and Behavioral Science, 16*, 107-112.

Jaffee, D. (1998, September). Institutionalized resistance to asynchronous learning networks. *Journal of Asynchronous Learning Networks, 2*(2), 21-32.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher, 33*(7), 14-26.

Katz, D., & Kahn, R. (1978). *The social psychology of organizations*. New York: Wiley.

Kellog, D. (2011). *40 percent of U.S. mobile users own smartphones; 40 percent are android.* Retrieved from http://blog.nielsen.com/nielsenwire/online_mobile/40-percent-of-u-s-mobile-users-own-smartphones-40-percent-are-android/

Klir, G. J. (1991). *Facets of systems science*. New York: Plenum Press.

Kraut, A. I. (1996). Introduction: An overview of organizational surveys. In A. I. Kraut (Ed.), *Organizational surveys: Tools for assessment and change*. San Francisco: Jossey-Bass.

Kurzweil, R. (2005). *The singularity is near: When humans transcend biology*. New York: Penguin Group.

Laufer, R. (1971, May). Sources of generational consciousness and conflict. *Annals of the American Academy of Political and Social Science, 395*, 80-94.

Leiter, M., Price, S., & Laschinger, H. (2010). Generational differences in distress, attitudes, and incivility among nurses. *Journal of Nursing Management, 18*, 970-980.

Lifecourse.com. (2010). Cohort shift. In *Method & insight*. Retrieved from http://www.lifecourse.com/mi/insight/cohort-shift.html

Light, R., Singer, J., & Willett, J. (1990). *By design: planning research on higher education*. Cambridge, MA: Harvard University Press.

Locke, E. (1982, January). The ideas of Frederick W. Taylor: An evaluation. *The Academy of Management Review (pre-1986), 1982*, *7*, 14-24.

Los Rios Community College District (LRCCD). (2011, October). *Fall 2011 student profile*. Retrieved from http://irweb.losrios.edu/do_esearch/StudentProfiles/FallProfiles/Fall2011_StudentProfile_FNL.pdf

Macky, K., Gardner, D., & Forsyth, S. (2008). Generational differences at work: Introduction and overview. *Journal of Managerial Psychology, 23*, 857-861.

Manfreda, L., & Vehovar, V. (2004). *A meta-analysis of response rates in web surveys compared to other survey modes.* Proceedings: American Association for Public Opinion Research.

Maronick, T. (2009). The role of the internet in survey research: Guidelines for researchers and experts. *Journal of Global Business and Technology, 5*(1), 18-31.

Matchingpurposeandtechnology.com. (2010). *Purpose*. Retrieved from http://www.matchingpersonandtechnology.com/purpose.html

Mills, S., & Tincher, R. (2003, spring). Be the technology: A developmental model for evaluating technology integration. *Journal of Research on Technology in Education, 35*, 382-401.

Morgan, G. (1996). *Images of organizations* (2nd ed.). Thousand Oaks: Sage.

Murray, A. (2011). Mind the gap: Technology, millennial leadership and the cross-generational workforce. *The Australian Library Journal, 60*(1), 54-65.

Murray, G. (2008). On the cutting edge (of torpor): Innovation and the pace of change in American higher education. *AACE Journal, 16*(1), 47-61.

Noble, S. M., & Schewe, C. D. (2003). Cohort segmentation: an exploration of its validity. *Journal of Business Research, 56*, 979-987.

Oblinger, D., & Oblinger, J. (2005). *Educating the net generation*. Retrieved from http://www.educause.edu/educatingthenetgen/

pcmag.com. (n.d.a). *feature phone.* Retrieved from http://www.pcmag.com/encyclopedia_term/0%2C1237%2Ct%3Dfeature+phone&i%3D62894%2C00.asp

pcmag.com. (n.d.b). *smartphone.* Retrieved from http://www.pcmag.com/encyclopedia_term/0,2542,t=Smartphone&i=51537,00.asp

Pew Research Center. (2010, February). *Millennials. Confident. Connected. Open to change*. Retrieved from http://www.pewresearch.org/millennials

Pew Research Center. (2011). *Generations and their gadgets*. Retrieved from http://www.pewinternet.org/Reports/2011/Generations-and-gadgets.aspx

Prensky, M. (2001, October). Digital natives, digital immigrants. *On the Horizon, 9*(5), 1-6.

Project Tomorrow. (2010). *Creating our future: Students speak up about their vision for 21st century learning*. Irvine, CA: Project Tomorrow.

Project Tomorrow. (2011). *Learning in the 21st century: 2011 trends update*. Irvine, CA: Project Tomorrow.

Ravid, R. (2011). *Practical statistics for educators*. New York: Bownman & Littlefield Publishers, Inc.

Reeves, T., & Oh, E. (2007). Generational differences. In J. M. Sector, M. D. Merrill, J. J. G. van Merrienboer, & M. Driscoll (Eds), *Handbook of research on educational communications and technology*. Mahwah, NJ: Lawrence Erlbaum Associates.

Rogers, E. (2003). *Diffusion of innovations*. New York: Free Press.

Roster, C., Rogers, R., Albaum, G., & Klein, D. (2004). A comparison of response characteristics from web and telephone surveys. *International Journal of Marketing Research, 46,* 359-373.

Roth, P., & BeVier, C. (1998). Response rates in HRM/OB survey research: norms and correlates, 1990-1994. *Journal of Management, 24*(1), 97-117.

Sahin, I., & Thompson, A. (2006). Using Rogers' theory to interpret instructional computer use by COE faculty. *Journal of Research on Technology in Education, 3*(1), 81-104.

Salajan, F., Schönwetter, D., & Cleghorn, B. (2010). Student and faculty inter-generational digital divide: Fact or fiction? *Computers and Education, 55*, 1393-1403.

Schaffhauser, D. (2010, February 1). What students want. In *IT directions*. Retrieved from http://campustechnology.com/articles/2010/02/01/what-students-want.aspx

Scott, W. R. (1981). *Organizations: Rational, natural, and open systems*. Englewood Cliffs, NJ: Prentice Hall.

Segall, P., & Freedman, G. (2007). *Building the 21st century campus - A leadership survey on the challenges facing North American higher education*. Blackboard White Paper.

Smith, S., Salway, G., & Caruso, J. (2009). *The ECAR study of undergraduate students and information technology*. Boulder, CO: Educause.

Smith, W. S. (2008). *Decoding generational differences*. Deloitte Development, LLC.

Strauss, W., & Howe, N. (1991). *Generations: The history of America's future, 1584-2069*. New York: William Morrow and Company, Inc.

Strauss, W., & Howe, N. (2000). *Millennials rising: The next great generation*. New York: Vintage Books.

Tilley, C. (Sep 2009). Texting. *School Library Monthly, 26*(1), 40-42.

Tolbize, A. (2008). *Generational differences in the workplace*. Retrieved from http://rtc.umn.edu/docs/2_18_Gen_diff_workplace.pdf

United States Department of Education (DOE). (2010). *Transforming American education, learning powered by technology*. Retrieved from http://www.ed.gov/technoloy/netp-2010

Van Der Werf, M., & Sabatier, G. (2009). *The college of 2020: Students*. Washington, DC: Chronicle Research Services.

von Bertalanffy, L. (1968). *General systems theory; Foundations, development, applications*. New York: George Braziller.

von Bertalanffy, L. (1972). The history and status of general systems theory. *The Academy of Management Journal, 15*, 407-426.

WorldOne Research (n.d.). *LexisNexis Technology Gap Survey*. Retrieved from http://www.lexisnexis.com/media/pdfs/LexisNexis-Technology-Gap-Survey-4-09.pdf

Yates, B., Adams, J. W., & Brunner, B. R. (2009). Mass communication and journalism faculty's perceptions of the effectiveness of email communication with college students: A nationwide study. *Learning, Media and Technology, 34*, 307-321.

Zemke, R., Raines, C., & Filipczak, B. (2000). *Generations at work: Managing the clash of veterans, boomers, xers, and nexters in your workplace*. New York: American Management Association Publications.

Zickuhr, K. (2010, December). *Generations 2010*. Retrieved from http://www.pewinternet.org/Reports/2010/Generations-2010.aspx

Appendix A: Site Access

LOS RIOS
COMMUNITY COLLEGE DISTRICT

American River College
Cosumnes River College
Folsom Lake College
Sacramento City College

1919 Spanos Court
Sacramento, CA 95825
Phone: 916 568-3021
Fax: 916 568-3023
www.losrios.edu

November 3, 2011

Victoria C. Rosario, MS
Principle Investigator and EdD Candidate
Drexel University
One Capitol Mall, Suite 260
Sacramento, CA 95825

SUBJECT: Doctoral Research Study

Dear Ms. Rosario:

Congratulations on completing the dissertation defense for your doctoral research proposal. By way of this letter, you are hereby granted permission to conduct a study at the Los Rios Community College District to complete the next step toward fulfilling conditions for completion of your doctorate.

It is my understanding that this will be an electronic survey, and you will be responsible for all costs and related expenses. Please contact Susie Williams, Los Rios Associate Vice Chancellor, Communications and Research, to assist you with the coordination of this important project.

Sincerely,

Brice W. Harris

Brice W. Harris, Chancellor

c: Susie Williams

Appendix B: Student Survey

Exit this survey

1. Welcome

Welcome to the CDWG 21st Century Campus Assessment Tool. This survey has been conducted nationally for the past four years to examine the role of technology in higher education. The results of this survey will help us understand the perceptions of campus technology.

This survey is a standardized, web-based, survey instrument which was created by CDW which is a leading provider of technology products and services for business, government and education. Since 2008, more than 4,000 students, faculty and staff from 2- and 4-year colleges and universities have participated in the survey which has been conducted annually. Your confidentiality is assured and nobody at Los Rios Community College District will see results identified at the individual level.

If you have questions about the survey, please contact Victoria Rosario at Los Rios Community College District at (916) 568-3150.

Thank you for your participation.

Completing the Survey
• Click on each response after you read each question.
• You will not be able to return to the survey, so please complete it in one sitting.
• To review a question, you may scroll back to that questions.
• Click “Exit this survey” if you do not want to complete the survey.
• Click "Next" to skip any item that does not apply to you or to continue with the survey.

2. Purpose of the Study

You are asked to complete this survey as part of a dissertation study on the perceptions of faculty, staff, and students on campus technology. The goal of this research is to better understand our current technology program.

Procedures
If you volunteer to participate in this study, we would ask you to complete and submit the web-based survey. Most respondents can complete this questionnaire in about 10 to 15 minutes, although individual progress will vary by how quickly you move through the questions.

If you volunteer to complete this survey, you may decide not to complete the survey for any reason at any time without consequence of any kind. The Los Rios Community College District does not offer payment for participation. Your completion of the web-based survey indicates your consent to participate in the study.

Potential Benefits to Subjects and/or Society
You may have the opportunity to reflect on your prior experiences as a faculty member, staff member or student which may enhance self-understanding. Results of your participation also will be directly beneficial to your college, and may benefit future generations of faculty, staff and students as well.

Potential Risks and Discomforts
There are no known risks of participating in the survey. However, there could be survey items that you are uncomfortable answering or to which you would simply prefer not to respond. Your participation in this study is strictly voluntary, and you will be under no obligation whatsoever to answer any questions that you are not inclined to answer. You may choose not to answer any specific questions you do not want to answer and still remain in the study.

Confidentiality
Please note that your responses will be used for research purposes only and will be strictly confidential. No information is obtained that can connect you with this study. Your college will not be able to examine your individual responses to any question.

Identification of investigators
If you have any questions or concerns about the research, please contact Victoria Rosario, at this address:

Los Rios Community College District
1919 Spanos Court
Sacramento, CA 95825
Email: rosariv@losrios.edu
Phone: 916-568-3150

Rights of Research Participants
You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research participant, contact Victoria Rosario, 1919 Spanos Court, Sacramento 95825, (916) 568-3150.

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3. Student Survey

In an ongoing effort to improve our services, support and commitment to your education, we would appreciate your participation in the following survey. This survey is designed to summarize our current technology program and provide information that we can use to shape the future direction of technology in our district.

1. Consider for a moment the classroom technology you used in high school (e.g. computers, interactive whiteboards, software, clickers, projectors, etc.). How does it compare to the classroom technology on your campus?

- o The classroom technology on my campus is significantly better than my technology in high school.
- o The classroom technology on my campus is about the same as my technology in high school.
- o The classroom technology on my campus is slightly worse than my technology in high school.
- o The classroom technology on my campus is significantly worse than my technology in high school.

2. When you were considering where to attend college, how important were an institution's technology offerings to you, including equipment and access to that equipment, in your selection process?

- o Very important
- o Important
- o Somewhat important
- o Not important

3. Thinking about the technology you use in college: how would you rate the current level of technology at your college?

- o Cutting edge with new/innovative technology adoption
- o Current technology with hardware/software that is no more than three years old
- o Adequate, but could be refreshed
- o Aging
- o In the dark ages

4. Thinking about how to leverage technology to increase your interest and performance in classes, which of the following technologies do you believe are essential to a 21stcentury classroom? Which of these technologies does your college offer/support? Which of these technologies do you use in conjunction with your education (e.g. to study, while in class, to work on projects)? Please select all that apply.

	Essential	College offers/supports	Currently use in conjunction with your education
Wireless network/Internet	o	o	o
Laptop/netbook computer	o	o	o
Desktop computer	o	o	o
iPod/MP3 player	o	o	o
Ereader device (e.g. Kindle, Nook, Sony e Reader)	o	o	o
Media tablet (e.g. iPad, Samsung Galaxy)	o	o	o
Smartphone (e.g. Blackberry, Droid phone, iPhone)	o	o	o
Video and/or web conferencing	o	o	o
Digital content (e.g. online books, material available online for download in electronic form)	o	o	o
Instant message/video chat (e.g. AIM, Gchat, Skype)	o	o	o
Open source applications (e.g. Google Apps, OpenOffice)	o	o	o
Social networking sites (e.g. Facebook, Twitter, MySpace)	o	o	o
Blogs/wikis	o	o	o
Podcasts/vodcasts	o	o	o
Course management system (e.g., D2L)	o	o	o
Access to the institution's network from home or another place away from school	o	o	o
Interactive whiteboard	o	o	o
Recorded class lectures	o	o	o
Virtual learning, which provides education to students who are not physically in the same location as the professor and/or other students	o	o	o
Multimedia content streaming	o	o	o
Other (please specify)			

5. I currently own/use the following technologies. Please select all that apply.
- o Broadband (high speed DSL/cable etc.) internet access at home.
- o Smartphone with data plan that allows extensive use of internet applications
- o Tablet computer (iPad or Galaxy tab, etc.)
- o Laptop or Netbook computer (very light and often low power)
- o Desktop computer
- o Electronic book device or eBook reader, such as a Kindle or Nook
- o Game console (Xbox 360, PlayStation 3, PSP, Wii, 3DS, etc.)
- o iPod or MP3 player

6. What cell phone do you use?
- o I don't use a cell phone
- o I use a feature phone (no web browser or data plan)
- o I use an iPhone
- o I use an Android phone
- o I use a Windows Mobile phone
- o I use a Blackberry phone
- o Other (please specify)

7. My text messaging plan is:
- o I don't text message
- o I pay for each text message
- o I pay for a midsized amount of text messages
- o I have an unlimited text message plan

8. Please tell us about your use of email. Please select all that apply.
- o I don't use email
- o I use email as little as possible
- o I have several email accounts
- o I like to keep college email separate from my other email
- o I forward my college email to another account
- o If the college provided a Gmail email account, I would use it

9. If the college offered to send text messages to my phone, I would want to receive messages concerning the following topics. Please select all that apply.
- o Key dates related to enrollment
- o Notice that I was enrolled from a wait list
- o Notice of class cancellations
- o Financial aid notifications/alerts
- o Reminders of counseling appointments
- o Reminders from faculty concerning class assignments and exams
- o Other (please specify)

10. How has technology- both personal and classroom- impacted your performance in the classroom? Please select agree, disagree or unsure for each.

	Agree	Disagree	Unsure
Technology has enabled me to achieve better grades	○	○	○
Technology has enabled me to collaborate more efficiently with faculty and other students.	○	○	○
Because of technology, I am more engaged in my classes.	○	○	○
Technology is a distraction in classes, and has negatively impacted my performance.	○	○	○
Technology has not impacted my performance in the classroom.	○	○	○

11. Please indicate how strongly you agree or disagree with the following statements.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
My college understands how I use or want to use technology as a learning tool.	○	○	○	○	○
My college's administration values technology as a learning tool.	○	○	○	○	○
My college is preparing me to successfully use technology as a business/professional tool when I enter the workforce.	○	○	○	○	○
Learning and mastering technology skills will improve my educational and career opportunities in the future.	○	○	○	○	○

12. Virtual learning delivers education to students regardless of where the professor and/or other students are located. Examples of virtual learning can include, but are not limited to, online classes and distance learning. Does your college offer the following?

	Yes	No	Don't know
Online classes/D2L	○	○	○
Distance learning (i.e. televised courses, video conferencing)	○	○	○

13. Have you ever taken a class through the following, either at your current college or previously?

	Yes	No	Don't know
Online classes/D2L	○	○	○
Distance learning (i.e. televised courses, video conferencing)	○	○	○

14. What, if any, are the benefits of virtual learning? Please select all that apply.

- ○ I do not see benefits of virtual learning/I do not want to take a virtual learning class
- ○ Virtual learning gives me the opportunity to study with a broader variety of faculty
- ○ Virtual learning enables me to interact with a greater number of fellow students
- ○ Virtual learning increases the variety of classes I can take
- ○ Virtual learning provides the opportunity for adults to take classes while working full-time
- ○ Virtual learning provides increased flexibility to take classes
- ○ Other (please specify)

15. What, if any, is the biggest challenge to classroom technology on your campus? Please select one.

- ○ Our classrooms are not outfitted with technology at all
- ○ Lack of support from my college's administration
- ○ Lack of technical support, which means that technology does not always work
- ○ Technology isn't useful to my course of study
- ○ The technology we have is outdated
- ○ Theft
- ○ Technology is fully integrated into my curriculum there
- ○ are no obstacles
- ○ Other (please specify)

16. If professors do not allow students to use technology in class, what are the reasons? Select all that apply.

- ○ It's distracting
- ○ Sending friends text messages during class time
- ○ Sending or receiving test answers
- ○ Bullying or harassment via unwanted text messaging
- ○ Taking and distributing inappropriate digital photos
- ○ Other (please specify)

17. How often do you use technology as a learning tool while in class?
- Every day
- Most classes
- Several times throughout the semester
- Rarely
- Never

18. I use technology to communicate with the following people to complete class assignments in class and outside of class. Please select in class or outside of class for the following options.

	In Class	Outside of Class
Peers/classmates	○	○
Faculty	○	○

19. Some colleges are moving from traditional print textbooks to a digital environment. What benefits, if any, do you see for you and your college from such a move? Please select all that apply.
- Instant access to content
- Access to current information
- Not having to use old text books
- Increased interest in learning
- Ability to take notes on a device, rather than on paper
- Ability to access multiple sources of content from one device
- Increased opportunities to learn
- Not having to take textbooks to class
- Ability to tailor reading assignments and other material to an individual student's needs
- Lower costs to purchase required course materials
- I do not see the benefits of digital or online textbooks
- Other (please specify)

20. Thinking about digital content as an alternative to traditional print textbooks, my college:
- Is using digital content
- Is considering using digital content
- Is considering a combined environment, which includes both print textbooks and digital content
- Is not considering using digital content
- Don't know

21. What challenges, if any, do you see for your college and students by moving to ereader/media tablet devices? Please select all that apply.
- Availability of or access to digital or online textbooks
- Availability of or access to a digital content reader of computing device
- Affordability of digital textbook device
- Ereader and media tablet devices do not have the functions that I need or want
- Student reluctance to move to digital or online textbooks
- Faculty reluctance to move to digital or online textbooks
- Administrative reluctance to move to digital or online textbooks
- I prefer print material
- Lack of understanding of the benefits of digital or online textbooks
- I do not want to use digital/online textbooks/etext
- There are no challenges to moving to digital or online textbooks
- Other (please specify)

22. How can colleges ease the transition to ereader/tablet devices? Please select all that apply.
- Don't make one or the other mandatory/ allow students to have the option of purchasing a physical textbook or an ereader/ media tablet device
- Allow students to choose their own device; offer several options
- Set up print kiosks on campus so that students can print materials as a low cost
- Other (please specify)

23. My primary school of attendance is:
- American River College
- Cosumnes River College
- Folsom Lake College
- Sacramento City College

24. How many units have you completed?
    - 1-5
    - 6-12
    - 13-20
    - 21-29
    - 30+

25. You are taking courses at your college for:
    - Certificate
    - Degree
    - Transfer
    - Continuing Education
    - Personal Interest

26. My age is:
    - Less than 18 years
    - 18 20
    - 21-24
    - 25-29
    - 30-39
    - 40-49
    - 50-59
    - 60+

27. My ethnicity is:
    - African American
    - Asian
    - Latino
    - Native American
    - White
    - MultiRace

28. My gender is:
    - Male
    - Female

29. What is your Gross Annual Household Income (income of all household members before taxes)?
    - $0 to $9,999
    - $10,000 to $14,999
    - $15,000 to $19,999
    - $20,000 to $24,999
    - $25,000 to $29,999
    - $30,000 to $34,999
    - $35,000 to $39,999
    - $40,000 to $44,999
    - $45,000 to $49,999
    - $50,000 to $54,999
    - $55,000 to $59,999
    - $60,000 to $64,999
    - $65,000 to $69,999
    - $70,000 to $74,999
    - $75,000 to $79,999
    - $80,000 to $84,999
    - $85,000 to $89,999
    - $90,000 or more
    - Decline to state

Appendix C: Faculty Survey

Exit this survey

1. Welcome

Welcome to the CDWG 21st Century Campus Assessment Tool. This survey has been conducted nationally for the past four years to examine the role of technology in higher education. The results of this survey will help us understand the perceptions of campus technology.

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Identification of investigators
If you have any questions or concerns about the research, please contact Victoria Rosario, at this address:

Los Rios Community College District
1919 Spanos Court
Sacramento, CA 95825
Email: rosariv@losrios.edu
Phone: 916-568-3150

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3. Faculty Survey

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1. How would you rate the current level of technology at your college?
   - o Cutting edge with new/innovative technology adoption
   - o Current technology with hardware/software that is no more than three years old
   - o Adequate, but could be refreshed
   - o Aging

2. On average, how do you feel about using technology in the classroom? (e.g. how comfortable are you using it as a teaching tool?)
   - o I understand technology and it is fully integrated into my classes.
   - o I believe that technology can be a useful tool and I encourage students to use it
   - o Technology is optional for my classes
   - o I do not understand technology and do not use it
   - o I understand technology but do not use it
   - o I do not understand technology but encourage students to use it

3. When you were considering where to teach, how important were an institution's technology offerings to you, including equipment and access to that equipment, in your selection process?
   - o Very important
   - o Important
   - o Somewhat important
   - o Not important

4. Thinking about how to leverage technology to increase your interest and performance in classes, which of the following technologies do you believe are essential to a 21stcentury classroom? Which of these technologies does your college offer/support? Which of these technologies do you use in conjunction with your role as a faculty member (e.g. prepare for lectures, while teaching a class, to work on projects, to work with colleagues and/or students)? Please select all that apply.

	Essential	College offers/supports	Currently use in conjunction with your education
Wireless network/Internet	o	o	o
Laptop/netbook computer	o	o	o
Desktop computer	o	o	o
iPod/MP3 player	o	o	o
Ereader device (e.g. Kindle, Nook, Sonye Reader)	o	o	o
Media tablet (e.g. iPad, Samsung Galaxy)	o	o	o
Smartphone (e.g. Blackberry, Droid phone, iPhone)	o	o	o
Video and/or web conferencing	o	o	o
Digital content (e.g. online books, material available online for download in electronic form)	o	o	o
Instant message/video chat (e.g. AIM, Gchat, Skype)	o	o	o
Open source applications (e.g. Google Apps, OpenOffice)	o	o	o
Social networking sites (e.g. Facebook, Twitter, MySpace)	o	o	o
Blogs/wikis	o	o	o
Podcasts/vodcasts	o	o	o
Course management system (e.g., D2L)	o	o	o
Access to the institution's network from home or another place away from school	o	o	o
Interactive whiteboard	o	o	o
Recorded class lectures	o	o	o
Virtual learning, which provides education to students who are not physically in the same location as the professor and/or other students	o	o	o
Multimedia content streaming	o	o	o
Other (please specify)			

5. I currently own/use the following technologies. Please select all that apply.
   - o Broadband (high speed DSL/cable etc.) internet access at home.
   - o Smartphone with data plan that allows extensive use of internet applications
   - o Tablet computer (iPad or Galaxy tab, etc.)
   - o Laptop or Netbook computer (very light and often low power)
   - o Desktop computer
   - o Electronic book device or eBook reader, such as a Kindle or Nook
   - o Game console (Xbox 360, PlayStation 3, PSP, Wii, 3DS, etc.)
   - o iPod or MP3 player

6. What cell phone do you use?
   - o I don't use a cell phone
   - o I use a feature phone (no web browser or data plan)
   - o I use an iPhone
   - o I use an Android phone
   - o I use a Windows Mobile phone
   - o I use a Blackberry phone
   - o Other (please specify)

7. My text messaging plan is:
   - o I don't text message
   - o I pay for each text message
   - o I pay for a midsized amount of text messages
   - o I have an unlimited text message plan

8. Please tell us about your use of email. Please select all that apply.
   - o I don't use email
   - o I use email as little as possible
   - o I have several email accounts
   - o I like to keep college email separate from my other email
   - o I forward my college email to another account
   - o If the college provided a Gmail email account, I would use it

9. Please indicate how strongly you agree or disagree with the following statements.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
My college understands how I use or want to use technology as a learning tool.	○	○	○	○	○
My college is preparing students to successfully use technology as a business/professional tool when they enter the workforce.	○	○	○	○	○
My college's administration values technology as a learning tool.	○	○	○	○	○
Technology is a critical component to students' success in college and/or when they enter the workforce.	○	○	○	○	○
Learning and mastering technology skills will improve my students' educational and career opportunities in the future.	○	○	○	○	○

10. What are the challenges to using technology to communicate with students? Please select all that apply.
- I want to shut down at the end of the day; technology requires that I'm "always on"
- In-person communication during office hours is most efficient for my schedule
- Technology does not provide the "hands-on" guidance that students need
- Students take advantage of technology like instant messaging and contact me during non-office hours
- There are no challenges to using technology to communicate with students
- Other (please specify)

11. Have you ever taught a class through the following, either at your current college or previously?

	Yes	No	Don't know
Online classes/D2L	○	○	○
Distance learning (i.e. televised courses, video conferencing)	○	○	○

12. What, if any, are the benefits of virtual learning? Please select all that apply.
- I do not see benefits of virtual learning/I do not want to take a virtual learning class
- Virtual learning gives students the opportunity to study with a broader variety of faculty
- Virtual learning enables students to interact with a greater number of fellow students
- Virtual learning increases the variety of classes students can take
- Virtual learning provides the opportunity for professional adults to take classes while working fulltime
- Virtual learning provides increased flexibility for students to take classes
- Other (please specify)

13. How has technology both- personal and classroom- impacted student performance in the classroom? Please select agree, disagree or unsure for each.

	Agree	Disagree	Unsure
Technology has enabled students to achieve better grades	○	○	○
Technology has enabled students to collaborate more efficiently with faculty and other students.	○	○	○
Because of technology, students are more engaged in my class.	○	○	○
Technology is a distraction in classes, and has negatively impacts student performance.	○	○	○
Technology has not impacted student performance in the classroom.	○	○	○

14. Does your college provide faculty professional development specific to technology and classroom technology integration?
- Yes
- No
- Don’t know

15. If your college provides you with technology-related professional development, how is it provided? Select all that apply.
- One-on-one meetings
- Videos/online tutorials
- Group meetings/seminars
- Peer mentoring
- Other (please specify)

16. How often does your college provide professional development specific to technology? Please select all that apply.
- My college only provides technology professional development when new technology is introduced
- My college provides technology professional development once each school year
- My college provides technology professional development three or more times each school year
- My college archives professional development tools on the network so professors can access them at any time
- My college has in-house technology experts (e.g. instructional design coordinator or faculty mentors) who conduct ongoing technology professional development

17. What, if any, is the biggest challenge to classroom technology on your campus? Please select one.
- Professors don't know how to use it
- Professors won't use it
- Professors use technology, but they do not allow students to use technology in classes
- Our classrooms are not outfitted with technology at all
- Lack of support from my college's administration
- Lack of technical support, which means that technology does not always work
- Technology isn't useful to the course of study on my campus
- The technology we have is outdated
- Lack of budget
- Theft
- Technology is fully integrated into the classroom- there are no obstacles
- Other (please specify)

18. If professors do not allow students to use technology in class, what are the reasons? Select all that apply.
- It's distracting
- Sending friends text messages during class time
- Sending or receiving test answers
- Bullying or harassment via unwanted text messaging
- Taking and distributing inappropriate digital photos
- Other (please specify)

19. Please think about your administration's top priorities for the 2011-2012 school year. What are the top 2 priorities?
- Using classroom technology to enhance student learning
- Addressing funding shortfalls, e.g. doing more with less
- Attracting and retaining students
- Making changes to academic programs
- Addressing staffing issues
- Updating existing facilities
- Improving and enhancing information technology
- Improving campus security
- Other (please specify)

20. Some colleges are moving from traditional print textbooks to a digital environment. What benefits, if any, do you see for you and your college from such a move? Please select all that apply.
- Instant access to content
- Access to current information
- Not having to use old text books
- Increased interest in learning
- Ability to take notes on a device, rather than on paper
- Ability to access multiple sources of content from one device
- Increased opportunities to learn
- Not having to take textbooks to class
- Ability to tailor reading assignments and other material to an individual student's needs
- Lower costs to purchase required course materials
- I do not see the benefits of digital or online textbooks
- Other (please specify)

21. Thinking about digital content as an alternative to traditional print textbooks, my college:
- Is using digital content
- Is considering using digital content
- Is considering a combined environment, which includes both print textbooks and digital content
- Is not considering using digital content
- Don't know

22. What challenges, if any, do you see for your college and students by moving to ereader/media tablet devices? Please select all that apply.
- Availability of or access to digital or online textbooks
- Availability of or access to a digital content reader of computing device
- Affordability of digital textbook device
- Ereader and media tablet devices do not have the functions that I need or want
- Student reluctance to move to digital or online textbooks
- Faculty reluctance to move to digital or online textbooks
- Administrative reluctance to move to digital or online textbooks
- I prefer print material
- Lack of understanding of the benefits of digital or online textbooks
- I do not want to use digital/online textbooks/etext

- There are no challenges to moving to digital or online textbooks
- Other (please specify)

23. How can colleges ease the transition to ereader/tablet devices? Please select all that apply.
    - Don't make one or the other mandatory/ allow students to have the option of purchasing a physical textbook or an ereader/ media tablet device
    - Allow students to choose their own device; offer several options
    - Set up print kiosks on campus so that students can print materials as a low cost
    - Other (please specify)

24. I work primarily at:
    - American River College
    - Cosumnes River College
    - Folsom Lake College
    - Sacramento City College

25. How many years have you taught at the college level?
    - 1-5
    - 6-12
    - 13-20
    - 21-29
    - 30+

26. I am:
    - Classroom faculty
    - Librarian
    - Counselor
    - College nurse
    - Coordinator
    - Other (please specify)

27. I am:
    - Full-time
    - Part-time

28. My age is:
    - Less than 18 years
    - 18 20
    - 21-24
    - 25-29
    - 30-39
    - 40-49
    - 50-59
    - 60+

29. My ethnicity is:
    - African American
    - Asian
    - Latino
    - Native American
    - White
    - MultiRace

30. My gender is:
    - Male
    - Female

Appendix D: Administrator Survey

Exit this survey

1. Welcome

Welcome to the CDWG 21st Century Campus Assessment Tool. This survey has been conducted nationally for the past four years to examine the role of technology in higher education. The results of this survey will help us understand the perceptions of campus technology.

This survey is a standardized, web-based, survey instrument which was created by CDW which is a leading provider of technology products and services for business, government and education. Since 2008, more than 4,000 students, faculty and staff from 2- and 4-year colleges and universities have participated in the survey which has been conducted annually. Your confidentiality is assured and nobody at Los Rios Community College District will see results identified at the individual level.

If you have questions about the survey, please contact Victoria Rosario at Los Rios Community College District at (916) 568-3150.

Thank you for your participation.

Completing the Survey
• Click on each response after you read each question.
• You will not be able to return to the survey, so please complete it in one sitting.
• To review a question, you may scroll back to that questions.
• Click “Exit this survey” if you do not want to complete the survey.
• Click "Next" to skip any item that does not apply to you or to continue with the survey.

2. Purpose of the Study

You are asked to complete this survey as part of a dissertation study on the perceptions of faculty, staff, and students on campus technology. The goal of this research is to better understand our current technology program.

Procedures
If you volunteer to participate in this study, we would ask you to complete and submit the web-based survey. Most respondents can complete this questionnaire in about 10 to 15 minutes, although individual progress will vary by how quickly you move through the questions.

If you volunteer to complete this survey, you may decide not to complete the survey for any reason at any time without consequence of any kind. The Los Rios Community College District does not offer payment for participation. Your completion of the web-based survey indicates your consent to participate in the study.

Potential Benefits to Subjects and/or Society
You may have the opportunity to reflect on your prior experiences as a faculty member, staff member or student which may enhance self-understanding. Results of your participation also will be directly beneficial to your college, and may benefit future generations of faculty, staff and students as well.

Potential Risks and Discomforts
There are no known risks of participating in the survey. However, there could be survey items that you are uncomfortable answering or to which you would simply prefer not to respond. Your participation in this study is strictly voluntary, and you will be under no obligation whatsoever to answer any questions that you are not inclined to answer. You may choose not to answer any specific questions you do not want to answer and still remain in the study.

Confidentiality
Please note that your responses will be used for research purposes only and will be strictly confidential. No information is obtained that can connect you with this study. Your college will not be able to examine your individual responses to any question.

Identification of investigators
If you have any questions or concerns about the research, please contact Victoria Rosario, at this address:

Los Rios Community College District
1919 Spanos Court
Sacramento, CA 95825
Email: rosariv@losrios.edu
Phone: 916-568-3150

Rights of Research Participants
You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research participant, contact Victoria Rosario, 1919 Spanos Court, Sacramento 95825, (916) 568-3150.

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3. Administrator Survey

In an ongoing effort to improve our services, support and commitment to your education, we would appreciate your participation in the following survey. This survey is designed to summarize our current technology program and provide information that we can use to shape the future direction of technology in our district.

1. Please think about your top priorities for the 2011-2012 school year. What are your the top 2 priorities?
   - o Using classroom technology to enhance student learning
   - o Addressing funding shortfalls, e.g. doing more with less
   - o Attracting and retaining students
   - o Making changes to academic programs
   - o Addressing staffing issues
   - o Updating existing facilities
   - o Improving and enhancing information technology
   - o Improving campus security
   - o Other (please specify)

2. How would you rate the current level of technology at your college?
   - o Cutting edge with new/innovative technology adoption
   - o Current technology with hardware/software that is no more than three years old
   - o Adequate, but could be refreshed
   - o Aging

3. Thinking about how to leverage technology to increase your interest student and faculty interest and performance in classes, which of the following technologies do you believe are essential to a 21stcentury classroom? Which of these technologies does your college offer/support? Which of these technologies do you use in conjunction with your role as an administrator? Please select all that apply.

	Essential	College offers/supports	Currently use in conjunction with your education
Wireless network/Internet	o	o	o
Laptop/netbook computer	o	o	o
Desktop computer	o	o	o
iPod/MP3 player	o	o	o
Ereader device (e.g. Kindle, Nook, Sonye Reader)	o	o	o
Media tablet (e.g. iPad, Samsung Galaxy)	o	o	o
Smartphone (e.g. Blackberry, Droid phone, iPhone)	o	o	o
Video and/or web conferencing	o	o	o
Digital content (e.g. online books, material available online for download in electronic form)	o	o	o
Instant message/video chat (e.g. AIM, Gchat, Skype)	o	o	o
Open source applications (e.g. Google Apps, OpenOffice)	o	o	o
Social networking sites (e.g. Facebook, Twitter, MySpace)	o	o	o
Blogs/wikis	o	o	o
Podcasts/vodcasts	o	o	o
Course management system (e.g., D2L)	o	o	o
Access to the institution's network from home or another place away from school	o	o	o
Interactive whiteboard	o	o	o
Recorded class lectures	o	o	o
Virtual learning, which provides education to students who are not physically in the same location as the professor and/or other students	o	o	o
Multimedia content streaming	o	o	o
Other (please specify)			

4. When you were considering where to teach, how important were an institution's technology offerings to you, including equipment and access to that equipment, in your selection process?
- o Very important
- o Important
- o Somewhat important

5. I currently own/use the following technologies. Please select all that apply.
- o Broadband (high speed DSL/cable etc.) internet access at home.
- o Smartphone with data plan that allows extensive use of internet applications
- o Tablet computer (iPad or Galaxy tab, etc.)
- o Laptop or Netbook computer (very light and often low power)
- o Desktop computer
- o Electronic book device or eBook reader, such as a Kindle or Nook
- o Game console (Xbox 360, PlayStation 3, PSP, Wii, 3DS, etc.)
- o iPod or MP3 player

6. What cell phone do you use?
- o I don't use a cell phone
- o I use a feature phone (no web browser or data plan)
- o I use an iPhone
- o I use an Android phone
- o I use a Windows Mobile phone
- o I use a Blackberry phone
- o Other (please specify

7. My text messaging plan is:
- o I don't text message
- o I pay for each text message
- o I pay for a midsized amount of text messages
- o I have an unlimited text message plan

8. Please tell us about your use of email. Please select all that apply.
- o I don't use email
- o I use email as little as possible
- o I have several email accounts
- o I like to keep college email separate from my other email
- o I forward my college email to another account
- o If the college provided a Gmail email account, I would use it

9. Please indicate how strongly you agree or disagree with the following statements.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
My college/worksite understands how students use or want to use technology as a learning tool.	o	o	o	o	o
My college/worksite is preparing students to successfully use technology as a business/professional tool when they enter the workforce.	o	o	o	o	o
My college/worksite understands how faculty use or want to use technology as a learning tool.	o	o	o	o	o
Technology is a critical component to students' success in college and/or when they enter the workforce.	o	o	o	o	o
Learning and mastering technology skills will improve my students' educational and career opportunities in the future.	o	o	o	o	o

10. How has technology both personal and classroom impacted student performance in the classroom? Please select agree, disagree or unsure for each.

	Agree	Disagree	Unsure
Technology has enabled students to achieve better grades	○	○	○
Technology has enabled students to collaborate more efficiently with faculty and other students.	○	○	○
Because of technology, students are more engaged in my class.	○	○	○
Technology is a distraction in classes, and has negatively impacts student performance.	○	○	○
Technology has not impacted student performance in the classroom.	○	○	○

11. Does your college/worksite provide faculty professional development specific to technology and classroom technology integration?

- ○ Yes
- ○ No
- ○ Don't know

12. If your college provides you with technology-related professional development, how is it provided? Select all that apply.

- ○ One-on-one meetings
- ○ Videos/online tutorials
- ○ Group meetings/seminars
- ○ Peer mentoring
- ○ Other (please specify)

13. How often does your college provide faculty with professional development specific to technology? Please select all that apply.

- ○ My college/worksite only provides technology professional development when new technology is introduced
- ○ My college/worksite provides technology professional development once each school year
- ○ My college/worksite provides technology professional development three or more times each school year
- ○ My college/worksite archives professional development tools on the network so professors can access them at any time
- ○ My college/worksite has in-house technology experts (e.g. instructional design coordinator or faculty mentors) who conduct ongoing technology professional development
- ○ My college/work site does not provide professional development in technology
- ○ Don't know

14. What, if any, is the biggest challenge to classroom technology on your campus? Please select one.

- ○ Our classrooms are not outfitted with technology at all
- ○ Lack of support from my college's administration
- ○ Lack of technical support, which means that technology does not always work
- ○ Technology isn't useful to the course of study on my campus
- ○ The technology we have is outdated
- ○ Lack of budget
- ○ Theft
- ○ Technology is fully integrated into the classroom- there are no obstacles
- ○ Other (please specify)

15. I work primarily at:

- ○ American River College
- ○ Cosumnes River College
- ○ Folsom Lake College
- ○ Sacramento City College

16. How many years have you worked at the college level?
    - 1-5
    - 6-12
    - 13-20
    - 21-29
    - 30+

17. My age is:
    - 21-24
    - 25-29
    - 30-39
    - 40-49
    - 50-59
    - 60+

18. My ethnicity is:
    - African American
    - Asian
    - Latino
    - Native American
    - White
    - MultiRace

19. My gender is:
    - Male
    - Female

Appendix E: Information Technology Survey

Exit this survey

1. Welcome

Welcome to the CDWG 21st Century Campus Assessment Tool. This survey has been conducted nationally for the past four years to examine the role of technology in higher education. The results of this survey will help us understand the perceptions of campus technology.

This survey is a standardized, web-based, survey instrument which was created by CDW which is a leading provider of technology products and services for business, government and education. Since 2008, more than 4,000 students, faculty and staff from 2- and 4-year colleges and universities have participated in the survey which has been conducted annually. Your confidentiality is assured and nobody at Los Rios Community College District will see results identified at the individual level.

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Thank you for your participation.

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• To review a question, you may scroll back to that questions.
• Click “Exit this survey” if you do not want to complete the survey.
• Click "Next" to skip any item that does not apply to you or to continue with the survey.

2. Purpose of the Study

You are asked to complete this survey as part of a dissertation study on the perceptions of faculty, staff, and students on campus technology. The goal of this research is to better understand our current technology program.

Procedures
If you volunteer to participate in this study, we would ask you to complete and submit the web-based survey. Most respondents can complete this questionnaire in about 10 to 15 minutes, although individual progress will vary by how quickly you move through the questions.

If you volunteer to complete this survey, you may decide not to complete the survey for any reason at any time without consequence of any kind. The Los Rios Community College District does not offer payment for participation. Your completion of the web-based survey indicates your consent to participate in the study.

Potential Benefits to Subjects and/or Society
You may have the opportunity to reflect on your prior experiences as a faculty member, staff member or student which may enhance self-understanding. Results of your participation also will be directly beneficial to your college, and may benefit future generations of faculty, staff and students as well.

Potential Risks and Discomforts
There are no known risks of participating in the survey. However, there could be survey items that you are uncomfortable answering or to which you would simply prefer not to respond. Your participation in this study is strictly voluntary, and you will be under no obligation whatsoever to answer any questions that you are not inclined to answer. You may choose not to answer any specific questions you do not want to answer and still remain in the study.

Confidentiality
Please note that your responses will be used for research purposes only and will be strictly confidential. No information is obtained that can connect you with this study. Your college will not be able to examine your individual responses to any question.

Identification of investigators
If you have any questions or concerns about the research, please contact Victoria Rosario, at this address:

Los Rios Community College District
1919 Spanos Court
Sacramento, CA 95825
Email: rosariv@losrios.edu
Phone: 916-568-3150

Rights of Research Participants
You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research participant, contact Victoria Rosario, 1919 Spanos Court, Sacramento 95825, (916) 568-3150.

Prev Next

3. IT Survey

In an ongoing effort to improve our services, support and commitment to your education, we would appreciate your participation in the following survey. This survey is designed to summarize our current technology program and provide information that we can use to shape the future direction of technology in our district.

1. How important is campus technology to your college's prospective students?
   - o Very important
   - o Important
   - o Somewhat important
   - o Not important

2. How would you rate the current level of technology at your college?
   - o Cutting edge with new/innovative technology adoption
   - o Current technology with hardware/software that is no more than three years old
   - o Adequate, but could be refreshed
   - o Aging

3. Thinking about how to leverage technology to engage and empower faculty and students, which of the following technologies do you believe are essential to a 21stcentury classroom? Which of these technologies does your college offer/support? Which of these technologies do you use in conjunction with your role in IT? Please select all that apply.

	Essential	College offers/supports	Currently use in conjunction with your education
Wireless network/Internet	o	o	o
Laptop/netbook computer	o	o	o
Desktop computer	o	o	o
iPod/MP3 player	o	o	o
Ereader device (e.g. Kindle, Nook, Sonye Reader)	o	o	o
Media tablet (e.g. iPad, Samsung Galaxy)	o	o	o
Smartphone (e.g. Blackberry, Droid phone, iPhone)	o	o	o
Video and/or web conferencing	o	o	o
Digital content (e.g. online books, material available online for download in electronic form)	o	o	o
Instant message/video chat (e.g. AIM, Gchat, Skype)	o	o	o
Open source applications (e.g. Google Apps, OpenOffice)	o	o	o
Social networking sites (e.g. Facebook, Twitter, MySpace)	o	o	o
Blogs/wikis	o	o	o
Podcasts/vodcasts	o	o	o
Course management system (e.g., D2L)	o	o	o
Access to the institution's network from home or another place away from school	o	o	o
Interactive whiteboard	o	o	o
Recorded class lectures	o	o	o
Virtual learning, which provides education to students who are not physically in the same location as the professor and/or other students	o	o	o
Multimedia content streaming	o	o	o
Other (please specify)			

4. What percentage of your college's classrooms are 21st century classrooms?
- 10%
- 25%
- 50%
- 75%
- 100%

5. When you were considering where to teach, how important were an institution's technology offerings to you, including equipment and access to that equipment, in your selection process?
- Very important
- Important
- Somewhat important
- Not important

6. I currently own/use the following technologies. Please select all that apply.
- Broadband (high speed DSL/cable etc.) internet access at home.
- Smartphone with data plan that allows extensive use of internet applications
- Tablet computer (iPad or Galaxy tab, etc.)
- Laptop or Netbook computer (very light and often low power)
- Desktop computer
- Electronic book device or eBook reader, such as a Kindle or Nook
- Game console (Xbox 360, PlayStation 3, PSP, Wii, 3DS, etc.)
- iPod or MP3 player

7. What cell phone do you use?
- I don't use a cell phone
- I use a feature phone (no web browser or data plan)
- I use an iPhone
- I use an Android phone
- I use a Windows Mobile phone
- I use a Blackberry phone
- Other (please specify)

8. My text messaging plan is:
- I don't text message
- I pay for each text message
- I pay for a midsized amount of text messages
- I have an unlimited text message plan

9. Please tell us about your use of email. Please select all that apply.
- I don't use email
- I use email as little as possible
- I have several email accounts
- I like to keep college email separate from my other email
- I forward my college email to another account
- If the college provided a Gmail email account, I would use it

10. Please indicate how strongly you agree or disagree with the following statements.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
My college/worksite understands how current students use or want to use technology as a learning tool.	○	○	○	○	○
My college/worksite is preparing students to successfully use technology as a business/ professional tool when they enter the workforce.	○	○	○	○	○
My college/worksite understands how faculty use or want to use technology as a learning tool.	○	○	○	○	○
Technology is a critical component to students' success in college and/or when they enter the workforce.	○	○	○	○	○
Learning and mastering technology skills will improve my students' educational and career opportunities in the future.	○	○	○	○	○

11. Virtual learning delivers education to students regardless of where the professor and/or other students are located. Examples of virtual learning can include, but are not limited to, online classes and distance learning.? Does your college offer the following?

	Yes	No	Don't know
Online classes/D2L	○	○	○
Distance learning (i.e. televised courses, video conferencing)	○	○	○

12. What, if any, are the benefits of virtual learning? Please select all that apply.
- ○ I do not see benefits of virtual learning/I do not want to take a virtual learning class
- ○ Virtual learning gives students the opportunity to study with a broader variety of faculty
- ○ Virtual learning enables students to interact with a greater number of fellow students
- ○ Virtual learning increases the variety of classes students can take
- ○ Virtual learning provides the opportunity for professional adults to take classes while working fulltime
- ○ Virtual learning provides increased flexibility for students to take classes

13. As part of virtual learning, some colleges offer video conferencing/lecture capture for students (e.g. using video conferencing to hear from a remote faculty member or having the option to view and listen to classes afterwards). Does IT support video conferencing and/or lecture capture as part of virtual learning?
- ○ Yes
- ○ No
- ○ Don't know

14. What, if any, is the biggest challenge to classroom technology on your campus(es)? Please select one.
- ○ Our classrooms are not outfitted with technology at all
- ○ Lack of support from my college's administration
- ○ Lack of technical support, which means that technology does not always work
- ○ Technology isn't useful to the courses of study on my campus
- ○ The technology we have is outdated
- ○ Lack of budget
- ○ Theft
- ○ Technology is fully integrated into the classroom- there are no obstacles
- ○ Other (please specify)

15. Please think about your administration's top priorities for 20112012 school year. What are the top 2 priorities?
- ○ Using classroom technology to enhance student learning
- ○ Addressing funding shortfalls, e.g. doing more with less
- ○ Attracting and retaining students
- ○ Making changes to academic programs
- ○ Addressing staffing issues
- ○ Updating existing facilities
- ○ Improving and enhancing information technology
- ○ Improving campus security
- ○ Other (please specify)

16. Some colleges are moving from traditional print textbooks to a digital environment. What benefits, if any, do you see for your college and students from such a move? Please select all that apply.
- ○ Instant access to content
- ○ Access to current information
- ○ Not having to use old text books
- ○ Increased interest in learning
- ○ Ability to take notes on a device, rather than on paper
- ○ Ability to access multiple sources of content from one device
- ○ Increased opportunities to learn
- ○ Not having to take textbooks to class
- ○ Ability to tailor reading assignments and other material to an individual student's needs
- ○ Lower costs to purchase required course materials
- ○ I do not see the benefits of digital or online textbooks
- ○ Other (please specify)

17. Thinking about digital content as an alternative to traditional print textbooks, my college:
- ○ Is using digital content
- ○ Is considering using digital content
- ○ Is considering a combined environment, which includes both print textbooks and digital content
- ○ Is not considering using digital content
- ○ Don't know
- ○ Other (please specify)

18. What challenges, if any, do you see for your college and students by moving to ereader/media tablet devices? Please select all that apply.
- Availability of or access to digital or online textbooks
- Availability of or access to a digital content reader of computing device
- Affordability of digital textbook device
- Student reluctance to move to digital or online textbooks
- Faculty reluctance to move to digital or online textbooks
- Administrative reluctance to move to digital or online textbooks
- Ereader and media tablet devices do not have the functions that I need or want
- Some students prefer print material
- Lack of understanding of the benefits of digital or online textbooks
- Students do not want to use digital/online textbooks/etext
- IT does not have the resources to support digital content devices
- There are no challenges to moving to digital or online textbooks
- Other (please specify)

19. How can colleges ease the transition to ereader/tablet devices? Please select all that apply.
- Don't make one or the other mandatory/ allow students to have the option of purchasing a physical textbook or an ereader/ media tablet device
- Allow students to choose their own device; offer several options
- Set up print kiosks on campus so that students can print materials as a low cost
- Other (please specify)

20. In order to provide reliable, "always on" access to 21st century campus technologies, which, if any, of the following IT infrastructure components does your campus need to improve or expand? Please select all that apply.
- Servers
- Storage
- Networking
- Wireless access
- Security
- Power
- Cooling
- My college's IT infrastructure does not need improvement
- Other (please specify)

21. Compared to the 20102011 school year, your 20112012 IT budget will:
- Remain the same
- Increase
- Decrease
- Don't know

22. I work primarily at:
- American River College
- Cosumnes River College
- Folsom Lake College
- Sacramento City College
- District Office

23. How many years have you taught at the college level?
- 1-5
- 6-12
- 13-20
- 21-29
- 30+

24. My age is:
- 21-24
- 25-29
- 30-39
- 40-49
- 50-59
- 60+

25. My ethnicity is:
    - African American
    - Asian
    - Latino
    - Native American
    - White
    - MultiRace

26. My gender is:
    - Male
    - Female

Appendix F: Participant Invite

You are asked to complete this survey as part of a dissertation study to measure college faculty, students and staff perceptions on various aspects of campus technology. The results of this survey will help us understand the perceptions of campus technology.

This web-based survey was created by CDW which is a leading provider of technology products and services for business, government and education. Since 2008, more than 4,000 students, faculty and staff from 2- and 4-year colleges and universities have participated in the survey on an annual basis. The survey should take approximately 10 – 15 minutes to complete and is for college personnel and students only. The information from this survey will be kept strictly confidential. Without exception, individual responses will not be released to anyone.

The website for the survey is http://www.surveymonkey.com/s/3VGZGS6

Simply click on this address to go directly to the survey. If this does not work, "copy and paste" this address into the address bar of your Internet Browser.

Your participation in this research is strictly voluntary. Your completion and submission of the questionnaire indicate your consent to participate in the study (please read the "Survey Information Sheet" on the survey website for more information). If you have questions about your rights as a research participant, you may contact Victoria Rosario, 1919 Spanos Court, Sacramento, CA 95822, (916) 568-3150.

Thank you for participating in this important technology survey.

Appendix G: Participant Reminder

Hello,

Recently I sent you an invitation to participate in an important survey of faculty, staff and students. Please provide your feedback on your experiences with technology.

The website for the survey is http://www.surveymonkey.com/s/3VGZGS6

Simply click on this address to go directly to the survey. If this does not work, "copy and paste" this address into the address bar of your Internet Browser.

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Thank you for participating in this important technology survey.

Victoria Rosario